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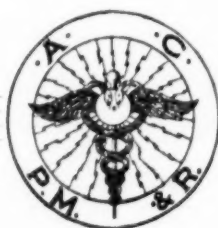
*Archives of*  
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(Formerly Archives of Physical Medicine)

*Official Journal*

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**VOLUME XXXIV**

**JUNE, 1953**

**NO. 6**

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**ANNUAL SESSION • CHICAGO • AUGUST 31-SEPTEMBER 4, 1953**

**American Congress of Physical Medicine  
and Rehabilitation**

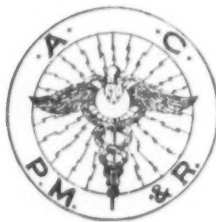
**31st Annual**

**Scientific and Clinical Session**

**and**

**Instruction Seminar**

**August 31 through September 4, 1953**



**Official Headquarters**  
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# INSTRUCTION SEMINAR

in conjunction with the

## 31st Annual Scientific and Clinical Session American Congress of Physical Medicine and Rehabilitation

PALMER HOUSE — August 31, September 1, 2, 3, 4, 1953 — CHICAGO

### SCHEDULE

| MONDAY MORNING — AUGUST 31  |  | MONDAY MORNING — AUGUST 31   |   |
|---|--|--|---|
| (A) 9:00-9:50 A.M.<br>Pathological Physiology<br>of Lesions of the Cervical<br>Portion of the<br>Spinal Cord and<br>Brachial Plexus         | (B) 10:00-10:50 A.M.<br>Pathological Physiology<br>of Lesions of the Lower<br>Spinal Cord and<br>Lumbar and Sacral<br>Plexus | Symposium on Cerebral Palsy<br>(1) 9:00-9:20 A.M.<br>Therapeutic Exercise for<br>Athetosis and Spasticity<br>Perlstein | (1) 9:20-9:40 A.M.<br>Bracing for Athetosis<br>and Spasticity<br>Allen  |
|   |  | Discussion Period<br>(2) 10:00-10:20 A.M.<br>Neurosurgery in<br>Cerebral Palsy<br>Fay                                  | (2) 10:20-10:40 A.M.<br>Preschool Training of<br>Cerebral Palsy<br>Gillette   |
| Brown   | Brown  | Discussion Period  |   |
| MONDAY AFTERNOON — AUGUST 31  |  | MONDAY AFTERNOON — AUGUST 31   |   |
| (C) 3:00-3:50 P.M.<br>Electromyography—<br>Basic Physiology of the<br>Motor Unit and Its<br>Electrical Activity<br>and Responses<br>Lambert | (D) 4:00-4:50 P.M.<br>Electromyography<br>Clinical Techniques<br>Lambert   | (3) 3:00-3:50 P.M.<br>Principles of<br>Muscle Reeducation<br>Bennett   | (4) 4:00-4:50 P.M.<br>Methods of Application<br>of Mass Movement and<br>Facilitation Techniques<br>for Therapeutic<br>Exercise<br>Kabat |
|   |  | TUESDAY MORNING — SEPTEMBER 1  |   |
|   |  | Symposium on Multiple Sclerosis<br>(5) 8:30-8:50 A.M.<br>Use of Drugs<br>Sweeney                                       | (5) 8:50-9:10 A.M.<br>Rehabilitation Procedures<br>and Aids<br>Gordon   |
|   |  | Discussion Period  |   |
|   | Kubicek  | WEDNESDAY MORNING — SEPTEMBER 2  |   |
|   |  | (6) 8:30-9:20 A.M.<br>Microthermy: Physiological Basis for Its Use,<br>Indications and Dangers<br>Rae                  |   |
|   |  | THURSDAY MORNING — SEPTEMBER 3   |   |
|   |  | (7) 8:30-9:20 A.M.<br>Classification, Diagnosis and<br>Treatment of Myelopathies<br>Marks                              |   |
|   |  | FRIDAY MORNING — SEPTEMBER 4   |   |
|   |  | (8) 8:30-9:20 A.M.<br>Complications of the Use of Hormones in the<br>Treatment of Rheumatism<br>Polley                 |   |
| TUESDAY MORNING — SEPTEMBER 1   |  |  |   |
| (E) 8:30-9:20 A.M.<br>Physiological Principles of<br>Artificial Respiration<br>Kubicek  |  |  |   |
| WEDNESDAY MORNING — SEPTEMBER 2   |  |  |   |
| (F) 8:30-9:20 A.M.<br>Physiological Background for Neuromuscular<br>Reeducation and Coordination<br>Knowlton                                |  |  |   |
| THURSDAY MORNING — SEPTEMBER 3  |  |  |   |
| (G) 8:30-9:20 A.M.<br>Pathology of Trauma<br>and Its Implications in Physical Treatment<br>Knapp  |  |  |   |
| FRIDAY MORNING — SEPTEMBER 4  |  |  |   |
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Note: The Committee on Education of the American Congress of Physical Medicine and Rehabilitation is in charge of the instruction seminar. It is purposely planned to limit the subjects in any year to a few topics in order to devote enough time to those subjects to give those attending a good review, both from the standpoint of basic knowledge and from the clinical standpoint. Certain groups of these subjects will be repeated every three to five years.

Courses are offered in two separate groups: One group, designated by letters, consists of eight lectures on basic subjects. A second group of eight lectures, designated by numerals, will present more general and clinical subjects. Physicians as well as physical therapists who are registered with the American Registry of Physical Therapists will be permitted to register for these courses. Members in good standing of the American Occupational Therapy Association are also eligible to enroll for the instruction course.

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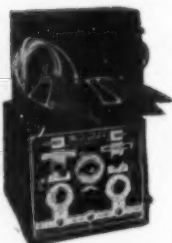
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Volume XXXIV

No. 6

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(Formerly Archives of Physical Medicine)

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# PROBLEMS IN FITTING AND ALIGNMENT OF BELOW THE KNEE PROSTHESIS\*

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The true criteria of an adequate and efficient prosthesis are its fit and utility. Ordinarily, B/K<sup>†</sup> prostheses are fairly good substitutes for real limbs as far as propulsion is concerned. The movements required are few and comparatively simple. They are fairly well imitated by the mechanical action of the present day prosthesis. However, for efficient propulsion, satisfactory weight bearing ability is a necessity. This is obtained through proper fitting and alignment, which is still an advantage possessed by few. The provision of a suitable prosthesis is the most important phase of the total rehabilitation of the amputee because the functional activity of the wearer will depend upon a proper fit.

In this country, the great majority of B/K stumps are fitted with a combination of lateral and base bearing sockets. With these, the body weight is being carried on some bony surface that is neither extensive nor prominent. As a general rule, a rigid socket is preferred, because when properly fitted it will distribute the pressures uniformly over the surface of the stump at the places where the stump can comfortably bear weight. Such a socket will maintain its exact shape indefinitely. This is important, because a socket made of soft material, such as leather, alters with wear. As a result, the weight is shifted to places that cannot tolerate it. In a well constructed socket, the body weight is borne on the expanding front and sides of the upper

end of the tibia. Frequently, the tibia expands very little, and the stump has sides that are almost parallel. The socket should be fitted to take advantage of every available surface that will tolerate weight. Even with a perfect fit, only a part of the weight is borne by the socket in the majority of cases. The remaining part of the weight is taken by the thigh corset. This is preferred by amputees, but, from a physiological standpoint, such weight bearing is unsound as it causes undue pressure on the thigh muscles. As a result, one invariably sees a marked degree of atrophy of these muscles with consequent loss of muscular strength. It is time that this practice be re-evaluated and changed. We believe that the majority of B/K amputees should have ischial bearing thigh corsets so that the weight can be borne by an area provided by nature for this purpose. This method may be uncomfortable at first, but, in the long run, it will prove beneficial.

One of the most common problems in B/K amputees is pain. This may be caused by an improper shape of the socket or by permitting it to carry too much weight around its rim. The greatest part of the weight should be borne on the anteromedial aspect of the medial tuberosity and on the sloping and wide medial surface of the tibia below it. No pressure should be exerted at the margin of the tibial plateau, especially in the region of the insertion of the joint capsule. Excessive pressure should be avoided on the tubercle, the sharp crest and lateral surface of the tibia, and on the head of the fibula, if this bone is left in situ. In addition, no pressure should be put on the peroneal nerve or

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\*\*From the Physical Medicine Rehabilitation Service, Thayer Veterans Administration Hospital, Nashville, Tenn.

<sup>†</sup>"Below the Knee," hereinafter abbreviated B.K.

the vascular parts of the stump in the popliteal space. Pressure in this area will interfere with circulation. The places where weight cannot be borne either because of presence of blood vessels and nerves or because of the proximity of the bone to the skin surface, due to poor protection afforded by soft tissues, should be protected against injury by recesses carved on the interior surface of the socket. As a general rule, no weight bearing should be allowed upon the end or lower sides of the stump.

Insufficient dorsiflexion in the artificial ankle joint may cause pain at the brim of the socket, located in the anterior aspect of the stump. This mechanical interference causes friction at the brim, because on locomotion the amputee has to exert more pressure on the socket of the prosthesis to overcome this ankle resistance. The dorsiflexion permitted in each prosthesis should be adjusted individually. Every person has a particular cadence that he uses for general everyday activity. This cadence shows a definite ratio between the range of motion of the knee and the ankle, and this ratio depends on the speed of the gait. In general, the gait of an amputee is slower than in an average person; it is therefore important to adjust the range of motion in the ankle to permit maximal mobility with maximal stability.

A study of military gait of 120 steps per minute (i.e., about 3.5 miles per hour) shows that in making a complete step the knee flexes considerably (more than 60 degrees), and the ankle has little motion (about 5-10 degrees). An average everyday gait is about 90 steps per minute. At this slower pace, the knee flexes less and the ankle shows more motion. A B/K amputee usually has a somewhat slower pace. It is generally between 60 and 80 steps per minute. The speed should be such that it provides a rhythmical gait, and the range of motion in the ankle joint should be adjusted to meet the needs of the amputee. However, it is important not to provide a too liberal motion, as this is fatiguing and produces instability. It also may cause dropping of the pelvis.

Pain in the low back may be caused by a short prosthesis. This is corrected by providing a limb of the proper length. However, another cause of pain in this region often missed, arises from wrong placement of the foot piece. Every prosthetic foot is aligned so that it is in somewhat of an equinus position. The degree of this plantar flexion should be determined by the amount of anteroposterior curvature of the spine in the lumbar region so that the center of the body weight will be transmitted through the prosthesis in such a way as to be evenly distributed on the three weight bearing points of the shod artificial foot.

Pain and pressure on the medial side of the stump near the brim and on the outer side near the end may be caused by improper adjustment of the thigh corset on the socket. Every B/K stump has the appearance of considerable "knock-knee." This becomes especially evident during weight bearing on the prosthesis because the center of gravity is shifted toward that side. This knock-knee appearance is due to the normal inclination of the upper part of the tibia. To accommodate this apparent genu valgum, the upright side bars connecting the thigh corset and the knee hinges must be aligned so that they allow for this angle. Otherwise, the socket will be held considerably straighter than the stump and will result in pressure at the medial border and a "contre coup" pressure at the lateral side of the lower end of the stump. To test this alignment, the patient should stand in a comfortable position on the prosthesis while the thigh corset is bent back out of the way. Then the corset is brought up into contact with the thigh, and the angle of the upright bars is noted. These bars should be parallel to the sides of the thigh.

Pressure and pain on the end of the stump may occur when the knee hinges are placed improperly, resulting in the stump's riding up and out of the socket during flexion. This is remedied by placing the axis of the hinges so that it corresponds with that of the normal joint. However, for stability these hinges are placed slightly posterior to the plumb line. If these hinges are fitted correctly,

the amputee will be able to sit with the knee flexed at right angles, and the socket will not press unduly in the popliteal space, nor will it slip up and down excessively.

In some B/K amputees of longer duration, pain may occur on the lateral side; this is associated with the sensation of a misfit socket in a prosthesis that was previously comfortable. An examination of the stump may reveal a prominent head of the fibula. This may be caused by an upward slipping of the remainder of the fibula, resulting from constant stress of weight bearing, or it may occur as the result of an outward rotation or tilting of this remainder of the fibula. This position is assumed because of the inward pressure of a tight socket exerted on the lower "free" end of the fibula. Here, the tibio-fibular joint acts as a fulcrum, and the head is tilted outward. This condition is corrected by excavating the socket at the proper site and filling in the excessive space. This will prevent slipping of the socket and localized edema of the stump, besides providing some weight bearing and stability.

Next to pain, the rotation of the prosthesis during locomotion may create a few problems in fitting. The most commonly observed abnormal twist to the gait occurs when the two side knee hinges are not aligned properly in three dimensional planes. The transverse axis of the hinge should be at a right angle to the line of progression, and both hinges should be on the same horizontal level, i.e., their height from the floor should be equal. In addition, the hinges themselves should be placed parallel to each other in the sagittal plane. If abnormal rotation creates pressure and pain, there may be several factors that produce this condition; the most frequent of these is an insufficient amount of motion at the artificial metatarsal joint, resulting from improper tension of the rubber bumper. Another factor is improper alignment of the artificial metatarsophalangeal joint or the so-called metatarsal wedge. The axis of this joint does not necessarily correspond to that of the normal foot. It is usually placed diagonally across at about 82 de-

grees from the long axis of the foot. Too much obliquity in the prosthetic foot causes excessive rotation during push-off and throws the amputee off lateral balance.

When the foot piece is improperly aligned on the ankle hinge, it may cause rotation. In the human being, the axis of the foot at the ankle joint is about 18 to 22 degrees externally rotated. This outward rotation should be provided in the prosthesis, but the "toe-out," as this is called, should be adjusted to the need of the individual regardless of the degree of toe-out of the sound foot. One of the most frequent errors made is in trying to force the prosthesis to duplicate the walk of the sound limb. Yet, observation shows that the limbs of an average person have their own peculiar degree of toe-out or rotation, and that usually one is carried with the toes more forward than the other. Why then insist that the amputee walk with both feet equally, thus making him forget the old patterns of motion that he used for decades, and why develop new ones?

### Conclusion

We have presented only a few problems that may have to be considered when fitting and aligning a B/K prosthesis. In attempting to provide a good fit and alignment of the prosthesis, the physician and the therapist must take "the whole individual" into consideration, studying the relationship between the different bodily segments of the amputee during rest and in motion and determining for each case the particular correction or alignment required. To accomplish this successfully requires, in addition to a good knowledge of body mechanics and kinesiology, a thorough understanding of the biophysical and mechanical principles involved in fitting and alignment. It must be realized that the prosthesis should be fitted to the individual and not the individual to the prosthesis.

### Summary

Successful rehabilitation of the amputee depends on several factors, namely the psychological make-up of the indi-

dual, the physiologic properties of the stump, the correct fit and alignment of the prosthesis, and the practice and training in its use. However, the basic determining factors, which ensure efficient propulsion and satisfactory weight bearing ability, are the proper fit and alignment.

Pain is one of the most frequent complaints of a B/K amputee. It may occur at different sites. These are discussed with an explanation of their causative factors. The other major complaint is due to the rotation of the prosthesis during locomotion. It may create problems in fitting and alignment.

Attention has been focused on two problems, which should be evaluated thoroughly and considered seriously in B/K amputees. One of them is the question of the provision of ischial weight-bearing thigh corsets. These will eliminate most of the pain and prevent vicious atrophy of the thigh muscles. The

other problem concerns the training of locomotion in all lower extremity amputees, where the commonly accepted method is to force the prosthetic extremity to duplicate the toe-out of the sound limb. An average individual rarely, if ever, walks with both feet showing identical rotation. Why then insist that the amputee do that?

Among the significant flaws in the prostheses available today are improper fit and improper alignment. To correct these, the physician and the therapist must consider the body mechanics and the relationship between the different bodily segments of the whole amputee during rest and in motion. They must base their correction on sound biophysical and mechanical principles involved in fitting and alignment. It must be realized that the prosthesis should be fitted to the individual and not the individual to the prosthesis.

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# A FOOT MUSCLE TESTER AND EXERCISER\*

WILLIAM BIERMAN, M.D.  
NEW YORK, N. Y.

Clinical and experimental evidence has demonstrated the possibility of the restoration of voluntary motion to a varying degree when it has been lost partially or completely. This occurs through hypertrophy of residual muscle structures and possibly through establishment of new neural pathways. This restitution of function is accomplished through the application of exercise. Reciprocal action and reflex activity assist in re-establishment of function. The character of the exercise is determined by the neuromuscular status. Where there is complete loss of voluntary activity, recourse must be had to passive motion or to electrical stimulation. The presence of only a trace or of poor muscle function indicates the need for free exercise; i.e., exercise which places the muscle at the greatest advantage. Fair and good functional power is increased through the use of resistive exercises.

Passive exercises are applied by the therapist or through the use of apparatus such as the sling and pulley. Free exercises are performed through the minimization of the influence of gravity. This is accomplished in water, on powdered boards, and on suspension apparatus. The resistive exercises are applied by the therapist or through the use of apparatus such as the De Lorme or shoulder wheels, pulleys and weights. The physiatrist must depend on the physical therapist for the application of these exercises. The apparatus itself incorrectly applied is of little value. The psychological factors are of tremendous importance. The optimistic influence of a pleasant and capable therapist cannot be overestimated. To be of greatest advantage, exercises should be performed at frequent intervals during the course of the day. A guiding slogan may be that borrowed from a railroad advertisement, "Every Hour on the Hour." Obviously, such a regimen would be impos-

sible of accomplishment in nearly all instances if the therapist had to administer these exercises herself. If it were possible to develop apparatus to permit the patient to administer his own exercises, such applications could be made at any desired frequency. However, it would still be necessary for the therapist to prescribe these exercises and to alter them in accordance with changing situations.

It would appear that we are now entering into a phase of our specialty where assistive exercise machinery is coming to the fore. But it cannot be over-emphasized that the therapist is the essential component in the administration of exercise and will undoubtedly remain so during the foreseeable future. Effective exercise apparatus, however, has some advantages. Motions can be performed through a more accurately limited arc. The rate at which such motions are applied can be more accurately regulated and the power employed for assistance or resistance can be gauged with a far greater degree of exactness. These advantages, in addition to the automaticity with which exercises can be applied, indicate that greater reliance will be placed upon the use of such apparatus.

The machine to which it is desired to call attention is designed primarily for the administration of exercises to the muscles which move the foot and lower extremity, but it can also be applied for exercises to the muscles moving the wrist, elbow and shoulder. It is also designed to measure the angles of motion at the ankle with a higher degree of exactness than is possible at present. In addition, it attempts to measure in terms of pounds or fractions thereof the power present in the muscles which produce ankle motion.

The foot is placed on a plate which is specially designed to hold it in firm apposition. A bandage wound around the foot and attached to numerous cleats creates the effect of a shoe accurately fitting the foot. A heel support on the

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foot plate can be moved so as to allow dorsal and plantar motion around a pivot corresponding to the region of the ankle joint. This foot plate can be moved from side to side as well as up and down. The exact degree of such motions can be determined by indicators. A torque meter attached to the foot plate and to a fixed point on the apparatus calibrated in fractions of a pound indicates the muscle pulls of the invertors, evertors, dorsiflexors and plantar flexors of the foot.

The apparatus is designed to administer passive, free, assistive, and resistive exercises. For administration of passive exercises, the foot plate is connected with an electric motor, the speed of which is variably diminished by reduction gears. The degree of excursion of the foot plate for both up and down and lateral motions can be regulated with extreme ex-

actness by a variable eccentric arrangement. It is possible to administer passive motion selectively either in dorsiflexion or in plantar flexion.

For its use in free, assistive and resistive exercise, the foot plate is disengaged from the motor through the agency of a clutch. The plate itself can be permitted to rotate inwardly and outwardly as well as up and down, or merely up and down in any desired position of inversion or eversion. A lever arm can be applied to the bar around which the foot plate revolves, so as to give either resistive or assistive exercise to the plantar or dorsiflexors. Varying weights can be threaded on the lever arm so as to permit variations in the resisting or assistive force.

This instrument has been found to be of value for the stretching of the so-called "short heel cord" because of rhythmicity, controlled frequency, and

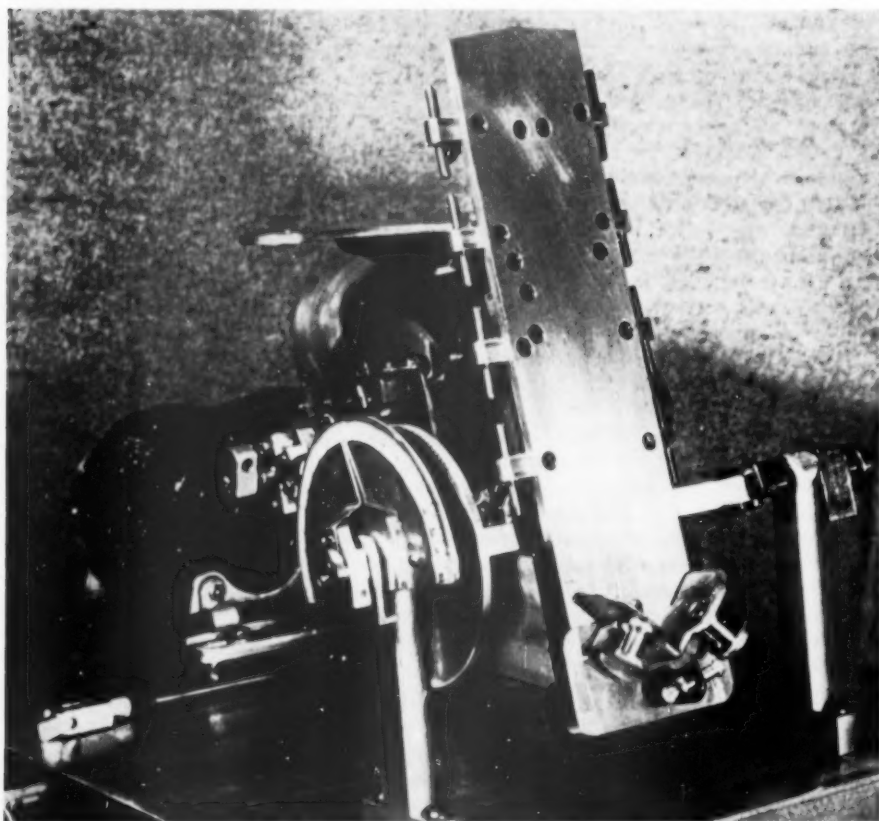


Fig. 1—Foot muscle tester and exerciser.

great exactness with which the range of excursion could be altered. With the use of this instrument, a preliminary investigation of fifty normal individuals revealed the average range of motion to be about as follows: dorsiflexion 16 degrees, plantarflexion 52 degrees, inversion 26 degrees and eversion 15 degrees. Except for inversion, these values are somewhat less than those quoted in other sources as for example those in the Orthopaedic Appliance Atlas. Our figures indicate that the normal foot dorsiflexes about  $\frac{1}{4}$  of the distance of its motion about a horizontal axis, and about  $\frac{3}{4}$  of the distance in plantarflexion. It moves about two-thirds of its rotary range of motion in inversion and about one-third in eversion. If the foot is held so that it cannot invert or evert, the range of its dorsi- and plantarflexion is reduced. In women, the range of dorsiflexion of the foot is less and the range of plantarflexion is greater than in men. Except for dorsiflexion, the range of motion of the foot diminishes with age.

For the purpose of administering various types of exercises to the foot, a non-motorized version of the apparatus described was constructed. This latter apparatus consists essentially of a foot plate constructed in similar fashion to that in the motorized machine. A cross bar is fixed on the under surface of the foot plate and toward its upper end. From the outer ends of this cross bar, attached cords go across three pulleys which carry the cords to the lower and outer edge of the device. Here variable weights are attached to the ends of the cords. When employed with the arrangement described, active plantarflexion causes the weights to be pulled up so that gravity will assist the foot in dorsiflexion. If the attached weights be heavy enough, dorsiflexion can be performed completely passively. If there be some degree of muscle action, that amount of weight can be added upon either the inner or outer side so as to give the required assistance to either the invertors or the evertors of the foot as they assist in dorsiflexion. Resistive exercises in dorsiflexion of the foot can be administered by fastening the cords with their attached

weights to the under surface of the foot plate. For this purpose, the cords pass over a fourth set of pulleys.

A modification of this apparatus consists in the use of a large grooved wheel attached to the bar around which the foot plate turns. A cord fastened to the rim of this wheel and tied to the required weights permits assistive or resistive exercises in dorsi- or plantarflexion. In order to favor the muscles on either the inner or outer side of the foot, the plate to which the foot is attached can be turned at any desired angle. If the plantar flexors as well as the dorsiflexors do not function, the patient can use his upper extremities (providing, of course, they have adequate power) to pull on cords attached to the foot plate and so move it either in dorsi- or plantarflexion.

#### Summary

Devices are described which permit of the application of active, free, resistive, passive, or variable assistive exercises to the foot. The devices also permit measurement of the extent of motions of the foot and indicates the power of the muscles which move it.

#### Discussion

Dr. Ralph E. Worden (Columbus, Ohio): Dr. Bierman graciously spent considerable time demonstrating to me the mechanical details of the apparatus and the techniques he has developed. My right foot was given the "full treatment." Many excellent ideas have been incorporated into the apparatus. It permits measurement of the degrees of motion of the foot in several planes and can provide passive, assistive, active, and resistive exercises to either foot. The motor driven machine is quite complicated and has a few "bugs" which Dr. Bierman is in the process of eliminating. It makes possible longer periods of resistive exercise than would be possible for the therapist to administer; and we would all agree that this is desirable in certain cases. However, it would be impossible for the patient to use the machine alone; someone must place the patient's foot and leg in the apparatus and wrap the foot and knee for stabilization. The pa-

tient can then start or stop the machine by means of a switch built into the extension cord. If any adjustment is necessary, it must be done by someone else. May I point out that this may be desirable because in most patients receiving therapeutic exercise proper supervision is the secret of success.

This apparatus makes possible many combinations of techniques. Several muscle groups of a foot can be exercised during a complete cycle. For example, if the foot dorsiflexors are weak to the point of needing assistance, that is possible during the up-stroke of the cycle. If the calf is tight, added force for stretching can be added for stretching at the end of the up-stroke. If the calf needs resistive or assistive exercise which would be applied during the down-stroke, that is possible. Such combinations are also possible for inversion and eversion motions. The toes are purposely bound down so that they function very little, if at all.

The motions of inversion and eversion are primarily sub-astragalar and inter-

tarsal motions. On Dr. Bierman's machine these motions are possible only from a fixed point at the underside of the foot plate, and in only one plane. This requires the lower leg and knee to be involved in the motion. For example, when inversion is attempted, the lower leg must swing a few degrees laterally. A universal joint at the foot plate, or better yet at the ankle joint, would probably correct this.

This machine is powered by a 1/10 h.p. motor which can be stopped easily by a few pounds of pressure from a strong calf. The small less powerful motor is best for this purpose. If a patient needs stretching to the calf, I am in favor of using a small force with many repetitions. The patient would no doubt be more cooperative than if a powerful force were used because it would in most cases be painful. Both exercisers can be used for the upper extremities, and the motor driven machine can be used to exercise the knee and hip by means of an extension on the foot plate and increasing the excursion.

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## PSYCHIATRIC PROBLEMS OF INTEREST FOR THE PHYSIATRIST\*

JOSEPH D. SULLIVAN, M.D.  
NEW YORK, N. Y.

In the last two years I have had the pleasure of working as a psychiatrist and Director of the Social Adjustment Department at the Institute for the Crippled and Disabled. I think at the outset I should tell you something about how the Institute functions. To begin with we operate on an out-patient basis, we have no resident patients. Patients are known as students at the Institute because they are being trained for a job. Concurrently with the vocational or industrial training they are receiving needed medical care and physical training in the medical out-patient department. The student is also followed in the Social Adjustment Department. It has been our experience at the Institute that more than half of the students require assistance with their emotional problems during their rehabilitation program. The mechanism of our rehabilitation effort is to bring together workers of various backgrounds in a teamwork approach. The director of our medical service is a physiatrist and on our medical staff there are specialists in internal medicine, orthopedics and neuro-surgery. We have various specialized programs in physical therapy and occupational therapy.

The psychiatrist is a member of the medical staff and in addition is head of the social adjustment service in which there are social workers, psychologists, a speech therapist, and a specialist in psychological retraining. In the vocational department training is offered in Optical Mechanics, Jewelry, Leathergoods, Commercial Art, Office Practice and academic subjects. There are also a sheltered workshop and vocational counseling and placement services. A principle of ours is that one person on the staff

should be assigned the task of studying and interpreting the individual program to the patient. Generally, this is a social worker, who coordinates the material arising in the other departments. She finds out the patient's reactions to what is happening to him in the various departments and elsewhere in the home and in the community. It is her job to help him solve his problems as they arise and to develop in him the facility for doing just that on his own. During the rehabilitation program there are special opportunities for the development of emotional stability that should not be neglected, for we have a relatively controlled situation, in which many of the emotional factors are objectively known by the worker. If psychological conflict develops under such circumstances it can be studied with an exactness which would be difficult to achieve elsewhere. The patient has an opportunity to develop an understanding of himself and his reactions. He need not go on endlessly repeating a pattern of reaction which is likely to cause him failure in adjustment both to his disability and to a prospective vocation.

There are many practical psychiatric problems of which the physiatrist should be aware. There are undoubtedly occasional schizophrenic or severely neurotic patients who need their physical disabilities. In these patients the disability is acceptable to them. It may offer them respectability or otherwise meet their dependent needs. Two examples will serve to illustrate this type of patient. A married man in his late thirties came to our institute for rehabilitation about a year after an apparent coronary occlusion. On psychiatric interview it was noted that he had a poor work record and a long history of hypochondriacal and psychosomatic preoccupation. He had been unable to support his family and had long

\*Presented at the Thirtieth Annual Session of the American Congress of Physical Medicine, Instruction Seminar, New York, N. Y., August 27, 1952.

been subject to the most derisive fault finding by his in-laws. One day he was suddenly struck with severe precordial pain. Only when he was completely prostrated did he succeed in achieving hospitalization at Bellevue over the carping criticism of his wife's family. When the doctors reported severe damage in the electrocardiogram the reaction in the relatives was complete and very satisfying to the patient. Their guilt feelings drove them to the most extravagant apologies, protestations of affection and promises of continued interest and support. It meant little that all subsequent electrocardiograms were so normal that the cardiologists wondered about the first one. The neurotic victory of the patient was too complete to be lightly surrendered. I did not feel that any rehabilitation program was likely to be successful when I saw the patient. He discontinued his visits to the Institute before he completed his Guidance Test Class.

A second patient was a former domestic, fifty-five years of age, who suffered from a rheumatoid arthritis. She had little contact with family or friends. She had been living in quiet dignity on public assistance at the YWCA where she did occasional volunteer work in the library. She had otherwise become withdrawn except for the movies, and her orientation toward life was completely unrealistic. She had come to the clinic ostensibly for physical therapy and job training, but at this late stage there was almost no remaining potential for competitive self-support.

These cases then are illustrative of defective motivation. To be more precise they bring up the question of the secondary gain of illness. Without going into the matter too deeply we may say that it is an ill wind which brings no good. With sickness or handicap there come rest from work, decrease of responsibility, kindness and attention from others and the opportunity to hide one's inferiority feelings behind a specific handicap which is readily appreciated and accepted by one's friends. The neurotic individual is particularly sus-

ceptible to secondary gains of disability. Psychiatrists term this type of disability, psychological invalidism.

It should be emphasized that this invalidism is not confined to the less disabled physically. It may occur equally well in those whose organic disability is very severe. I recall a paraplegic patient, forty-eight years of age, who sustained his disability in an automobile accident five years prior to coming to the Institute. His personality was blandly psychopathic. He had worked sporadically and only when he had to. As a young man he had done considerable drinking and gambling. He treated his wife shabbily and was probably cruel to her. He acquired a small house, cheaply, in the depths of the depression. He became very miserly. He worked at odd jobs as a handyman and a mechanic's helper. A few months prior to his accident he took a job as janitor in a bank. His injury occurred when he was traveling in a fellow employee's car to a party which was sponsored by his company. He secured a ruling that his accident was covered by Workmen's Compensation. He had a complete lumbar transection syndrome. He frankly never visualized himself as working again. He made no effort to get out of his wheel chair. The insurance company made dire threats if he did not cooperate in a rehabilitation program. He agreed passively to contribute his physical presence, but he regarded the program as a farce for several months. The gait training instructor was a paraplegic veteran who was an enthusiast and a hard taskmaster. The patient found him annoying and irritating at first. The only thing he liked about the set up was living in a hotel in New York, with some spending money. Gradually he discovered some skills in office practice. He made some progress in this and developed some slight interest in it. Ultimately he made some improvement in his gait training. He was motivated here at least partially by his desire to extend his stay in New York and partially to show up the instructor. The instructor developed insight into the patient's per-

sonality and learned not to push him, and to allow him to find out things by himself. Rather more progress was shown in 10 months than had been expected. We doubt very much, however, that he will go on to any effective employment, especially if he should feel that it is likely to interfere with his compensation.

Several general groups will be discussed among the disabilities. Each worker develops certain clinical impressions which are difficult of statistical substantiation and sometimes poorly founded. The first group I should like to discuss is the young adult patient with cerebral palsy. One of the clinical impressions which we have inherited is that there are roughly two personality types approximating the two physical types of cerebral palsy. Thus, there are said to be a so called "spastic personality" and an "athetoid personality." The spastic is supposed to be excessively fearful, he is said to have a tendency to become withdrawn and hostile, whereas the athetoid patient is regarded as more out-going, docile, and sociable. From studies and observations going forward at the Institute, it seems that these assumptions may be unjustified. This will be discussed further in a publication by a member of our psychological department. One thing that impresses us at the Institute with regard to the patient with cerebral palsy is the exaggerated goal attitudes with which they approach training and therapy. This almost always has to be dealt with when working with these patients, and is most characteristic of them as a group. Perhaps the most impressive work that has been accomplished at the Institute with cerebral palsy patients outside of our physical therapy program, has been in our psychological retraining department. Here the psychological subtleties of brain damage are studied and corrective measures instituted. Many of these patients have difficulty with binocular vision, which interferes with adjustment and which is responsible for apparent eccentricities.

The hemiplegics as a group also offer

special problems. Thus, in aphasic patients there is often a reaction of hostility and aggression against the world which he feels does not understand and does not seem to be interested in him. If this hostility is allowed expression as in the group therapeutic situation, considerable improvement in speech and tractability in physical therapy is likely to be encountered. Another point of special interest about the hemiplegic is that he is likely to be the patient who is least accepting of his disability. He is likely not to be seeking an adjustment to it and a new adaptation, but to be constantly preoccupied with a cure and a return of his pre-morbid function. It is with this group more than with any other that difficulty in terminating physical therapy is encountered. After maximum improvement has been achieved, the patient still seeks to continue the physical therapy and is likely to resent and disagree with other attempts at social adjustment. We have not learned yet how to deal efficiently with this problem, but we feel it important for the therapist to evaluate objectively and currently the patient's improvement. It is wise to introduce social adjustment services very early, so that learning to get along with the disability may be begun.

In the amputee an ever recurring problem is the painful phantom limb. We do not know the answer to this one either. We know that phantoms occur in more than 90 per cent of the cases, that painful phantom is much less frequent, and that an excessive preoccupation with the phantom is to a considerable extent an outgrowth of the patient's personality. It is our belief that the earlier the prosthesis can be applied, the less likely are seriously disabling phantom phenomena to become a problem; that it is best to get the prosthesis on and operating as soon as possible.

There is a neurosis which occasionally develops among the chronically disabled which should be brought to the attention of psychiatrists. It may be termed the social manipulative neurosis. An ex-

ample of this is a woman, forty-four years of age, who had had polio at the age of two with involvement of all four extremities. The disability was most marked in her legs with some limitation of function of the right hand and the left upper arm. The patient had been neglected in physical therapy and academic training. She actually had not seen anybody therapeutically since the age of five or six. She had trained herself in crutch walking. She had not much more than 6 months of formal training but she learned to read and write with some efficiency. She was poor in arithmetic, but had fairly good general information. She had not traveled on her own at any time. She was one of four children. The patient was cheerful, friendly, and spoke in a conversational manner with some anxiety and voice quavering was apparent. Some emotional lability was demonstrated. She had married and become a widow. In psychiatric interview no primary mood deviation and no bizarre thinking trends were noted and her affect was appropriate. There was considerable insecurity with regard to herself. Thus when general information was gone into, she felt very timid about telling such things as who was the Governor of her state and the functions of the various civil officers. Yet all of her information was actually adequate. The patient said she was "ashamed" of her educational limitations and she complained of the restrictive and over-protective attitude on the part of her relatives but she did not express any hostility.

From her history and from the present interview situation, it was believed that the patient was not lacking in aggressiveness and some manipulative skills with regard to her relatives. Actually she had been left some money by her husband, but she was entirely supported by her sister who was also a widow. A brief discussion of the general situation with the patient's sister indicated that the latter resented the fact that the patient's other sister and brother were not assisting. The sister expressed considerable anxiety about the patient's being out by

herself, especially that she might fall and be hurt. She had many inquiries about how long the training program would be and about the details of the program. It was hoped that the patient might do well and profit from the various functions of the Institute. Things did not work out as well as had been hoped. The reason was partly a very real transportation problem. It became apparent, however, during the patient's short stay that there was another source of difficulty. Despite the patient's pleasantness of manner, her courage, the achievement which she had made on her own, and the desire and willingness on the part of everyone to help her, things did not go as smoothly as usual among the staff. One complained that another had kept the patient waiting unduly. There seemed to be a bit more wrangling than usual about how to approach her particular rehabilitation program as a whole. It was felt that this patient was both aggressive and chronically fearful and that she had somehow managed over the years to use her disability to work on the conflicting emotions of her family, playing one against the other, creating disharmony, and resisting any effective management of her disability which did not go along with her own ideas. The patient seemed to have managed somehow in her very short contact at the Institute to create in a lesser way the same problems among the staff. When you find in your own therapeutic set up that arguments or difficulties develop among your staff over a certain patient and that all of these people seem to be sympathetic and interested, the personality of the patient should be evaluated more thoroughly.

The physician who makes physical medicine his main study is somewhat in danger of avoiding specific preoccupation with the instruments of psychological medicine; but, on the whole, physiatrists more than some other physicians appear to have become alerted to this possibility and they have made more efforts in understanding the psychological components of illness than many of their colleagues in general practice and in the

other specialties. It has been said that the general physician need pay relatively little attention to psychiatric diagnosis. There is perhaps some merit to this position, he can recognize the major psychological disorders quickly and these are referred to the psychiatrist. It does him or the patient relatively little good to classify and categorize the patient, psychiatrically. However, the physicians would do well to familiarize themselves again with the major headings of the mental status. These headings are only five in number. They are simple, almost self-explanatory and may be stated as follows: 1. appearance and behavior; 2. talk or manner of speech; 3. mood estimate; 4. content of thought, and 5. sensorium, which is perhaps a more difficult area to evaluate. The sensorium has to do with the patient's orientation to person, time and place, and an evaluation of his memory, his ability to calculate, etc. If the first four headings are studied a little bit, it will be seen how easy it is to make a notation with regard to them with the patient during an interview.

Thus, one notes under appearance and behavior whether there are striking peculiarities of dress, of posture, or of manner, or whether there are any subtleties which might be noted for the future. The matter of the patient's speech is as quickly evaluated; is he overtalkative? Does he seem to be talking under pressure? Is there blocking in his speech? Does he speak dramatically?

Under mood evaluation one can readily make a notation with regard to the patient's subjective mood statements; what does he say in reply to such questions as, how do you feel generally?; how are your spirits? One can also include one's own evaluation of such matters as motor retardation and general cheerfulness. One can note an estimate of the emotional fluctuation during the interview and whether or not the emotions seem appropriate to the material under discussion. The latter is what is considered under content of thought. The examiner may note readily whether or not the things with which the patient

is concerned with seemed strange to him. He will also note whether or not the patient seemed to put undue emphasis on certain aspects of his disability and his general position in life. Without coming to any specific psychiatric diagnostic formulation, the physician now has available a much more definitely meaningful evaluation of the patient as a person. This is bound to be useful in subsequent relationships with the patient.

There is no expectation that the physician is going to undertake any formalized psycho-therapeutic program with the patient. However, he must realize that he cannot merely become a specialist dealing with disease and physiological pathology, but that he is dealing with patients, the persons who are afflicted. The physician comes to recognize that a kindly, constructive attitude, which includes listening to the patient and understanding his point of view, is almost as helpful as any specific therapeutic measure which he might institute. The physician must also learn to recognize unfavorable reactions of his own. If he finds himself getting angry with patients or cutting them short, or expecting too much of them, he must make an effort to re-orient himself. He must recognize that the patient's attitudes and apparent misbehavior are almost never malingering or an expression of hostility or negativism to the physician, because misbehavior is largely unconscious in origin and is always indicative of an inner conflict. Fear, discouragement and dissatisfaction with oneself are powerful forces, which are capable of becoming chronic and seriously disturbing to the human being. The therapeutic attitude of the physician can never be deserted, it is especially important in the first contacts with the patient. A careful patient history can itself be therapeutic with a frightened or anxious patient. The physician who insists upon injecting his own personality is not allowing the patient what he needs, especially in the early stages of relationship.

The physician who is honest with his patients and is at the same time reassuring, encouraging and persuasive,

has achieved an excellent therapeutic balance. The physician who can listen more than he talks, is more likely to help the patient to change an unfortunate attitude, than one who simply demands or insists upon the development of an attitude change. Perhaps the most frequently heard objection made by the practical minded physician is that he

has no time for psycho-therapy. He is practically admitting that he has no time for patient's problems, and indeed no time for patients. The patient's psychological needs are just as great as his physical needs. They must be met if the patient is to make satisfactory adjustment.

## THE BED WALKER

### A New Therapeutic Apparatus For The Control Of Venous Stasis \*

S. H. MAY, M.D.  
NEW YORK, N. Y.

The inability to move or the inadvisability of actively moving the lower extremities unleashes a chain of serious disorders frequently terminating fatally. Many attempts to prevent peripheral stasis and to accelerate the peripheral blood flow in the bedridden patient have proved inadequate as well as impractical because of overtaxing the nursing staff. From a physiological viewpoint the ideal procedure would be to mimic the natural walking act, because it sets in motion the numerous leg muscles moving the blood stream centripetally.

After much laboratory and bedside experimentation an apparatus was perfected which proved both simple and physiologically correct. Electrical power provided by a three-quarter horse power motor propels two pedals which alternately raise and lower the attached shoes in which the patient's feet are inserted. The speed is fixed so as to produce a slow, steady walking action. The thighs should be supported by folded pillows to avoid fatigue. Preferably, however, the bedstand is used—a bar connecting two metal frames placed on the bed over the patient's legs, a slight distance from the knees. From this bar two leather belts

are suspended; the calves of the patient are placed and fastened in the leather slings. At each downward motion a solid pressure is exerted on the calf musculature, which in itself stimulates and "milks" the saphenous venous system. The bedstand is particularly indicated in hemi- and paraplegic patients because of the tendency of a paralyzed extremity to topple over. The padded panels set in the frame of the bedstand will prevent this. The patient is in control of the switch and initiates and stops his "walk" at his convenience and comfort. The apparatus can be adjusted to any bedridden subject with a minimum of attendance; it can be used in any bed at home or in the hospital and as often as desired in a hospital ward by moving it from patient to patient. Figure 1 pictures the apparatus in use.

The introduction of the apparatus to many bedridden patients has thus far fulfilled every expectation. The patients were markedly comforted and showed a decided wish to continue its use. It was found that a five to eight minute "walk" at a time is sufficient and of most benefit to the patient. No untoward effects have been observed and no thromboembolic accidents have occurred. The energy expenditure in the use of the device is practically nil.

\*From the Department of Physical Medicine and Rehabilitation, Goldwater Memorial Hospital, New York, N. Y.

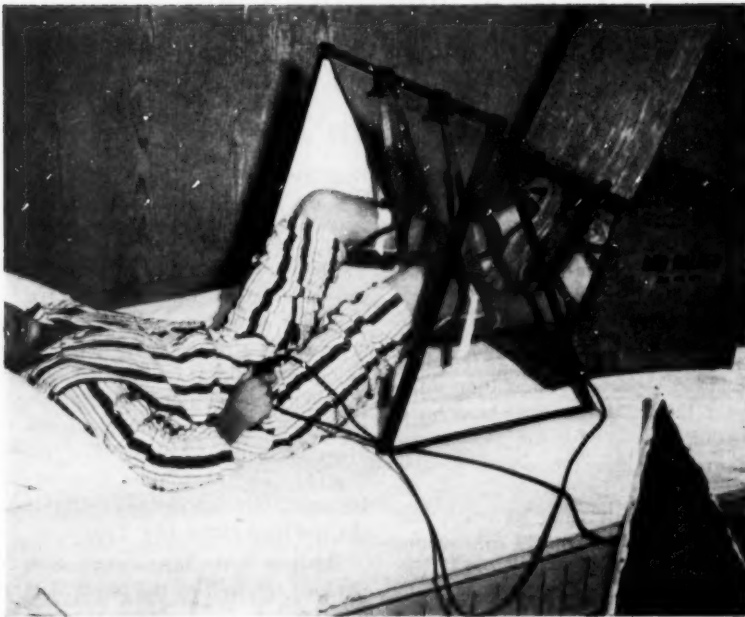


Fig. 1

To express the purpose of the instrument it was called the "Bed Walker" as of January 10, 1951. Its use is indicated in any postsurgical, posttraumatic, neurological or circulatory disorder where ac-

tive motion is precluded and where activation of motion is mandatory for the prevention of ankylosis, osteoporosis, trophic lesions and most especially, of phlebothrombosis.

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# Effect Of Physical Modalities Upon Saphenous Circulation Time Using A Radioactive Tracer\*

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## Introduction

In a previous preliminary report<sup>1</sup> a description was given of the saphenous circulation time test using radioactive iodine ( $I^{131}$ ). Saphenous circulation time, as used in this discussion, may be defined as the time it takes for the radioactive tracer injected into the dorsal medial vein of the foot, i.e. the beginning of the long saphenous vein, to reach the sapheno-femoral junction. In spite of the name, it must not be assumed that the venous flow is solely by way of the long saphenous vein. On the contrary, the injected radioactive iodine mixes almost immediately with the blood at the injection site, and is then carried by all paths at its disposal to the sapheno-femoral junction where it may be detected by the scintillation counter. In the absence, therefore, of barriers, natural or artificial, the saphenous circulation time, as discussed in this paper, is a reflection of the venous circulation through various inter-connecting pathways.

## Method of Study

The technique is the same as previously described<sup>1</sup>, except that with the acquisition of a more sensitive sodium iodide scintillation counter<sup>2</sup> smaller doses of radioactive substances can be given. The dose usually is 5 microcuries. Occasionally  $7\frac{1}{2}$  to 10 microcuries have been required for a sharper endpoint. Between tests, the vein is kept open by a continuous drip of normal saline solution, at room temperature. Immediately before

testing, the flow of saline is interrupted, the radioactive iodine is injected, and the time of injection is indicated on a continuous strip chart recorder of the Esterline-Angus 0-1 ma. type. With the scintillation counter placed over the sapheno-femoral junction, gamma radiation is readily detected and recorded (fig. 1). The circulation time can then be accurately ascertained by a study of the resulting curve (fig. 2).

Subjects were chosen at random from patients referred to the physical therapy department. Control times were taken before treatment was begun. Several of these were usually obtained and the lowest value used for experimental comparison. Experimental readings were taken immediately after cessation of treatment. Only where the control time was reduced by 20 percent or more by the tested modality, was the saphenous circulation time called improved. When more than one modality was used during one testing period, a repeat control reading was obtained before a second method was used. In the event that flow time had been significantly shortened by the preceding treatment, a sufficient interval was allowed for the time to approach its original value. This usually did not exceed fifteen to twenty minutes. When sinusoidal stimulation was applied to the calf, control values were taken with the moistened pad in place. In general a long control time was seen most frequently in patients with arteriosclerosis, cardiac decompensation, or varicose veins; however, the same finding was occasionally encountered in the absence of apparent vascular disease. Of interest were two cases which had undergone unilateral lumbar sympathectomy for arteriosclerotic disease of the

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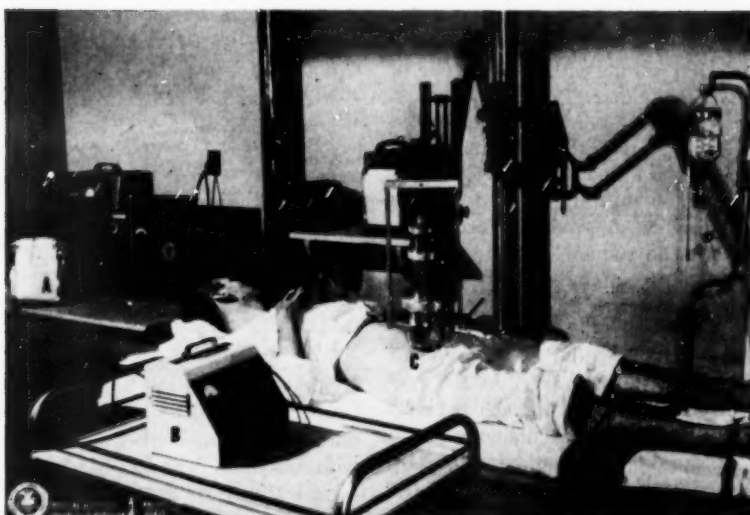


Fig. 1—The apparatus in place for determination of saphenous circulation time. (a) continuous strip chart recorder; (b) sinusoidal machine (Zankel Autosurge); (c) scintillation counter over sapheno-femoral junction; (d) normal saline solution for keeping vein open between tests, and (e) intravenous needle inserted in beginning of saphenous vein.

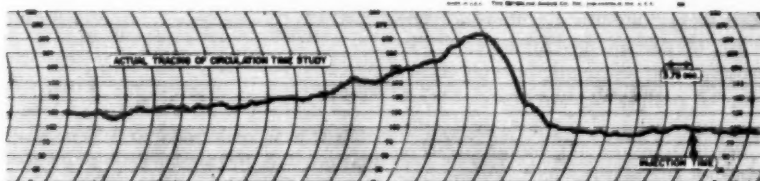


Fig. 2—A typical curve, showing the endpoint as indicated by a rise in radioactivity. Time is read from right to left on the abscissa.

legs. The control times were thirty-three and thirty-seven seconds respectively on the unoperated sides, but only eight seconds on the sympathectomized sides. Rate of flow could not be increased in the operated sides by sinusoidal stimulation as described below; however, a decline to nineteen and twenty-seven seconds respectively was achieved on the unoperated sides. There was no correlation of clinical status with positive or negative response to any of the types of therapy.

The present report will include the effect upon saphenous circulation time of (1) sinusoidal stimulation of calf muscles; (2) heat, shortwave and microwave diathermy to the lower abdomen and thigh; (3) rhythmic constriction and ex-

ercise of the lower extremity, and (4) vibration applied to the calf. A total of 986 separate injections was given to 122 patients. Of these, 301 were control readings before testing with the appropriate modality, 200 were post-treatment.

#### Effect of Sinusoidal Stimulation

In a previous report<sup>3</sup>, using sodium cyanide as a test medium, it was shown that sinusoidal stimulation of calf muscles reduces circulation time in the lower extremity. In view of the fact that this technique is being used post-operatively for the prevention of thrombosis and embolism<sup>4,5</sup>, it was decided to compare the efficacy of several different types of sinusoidal stimulation.

**Type of Machine:** Four machines were employed. Machine A utilizes a sixty cycle current, with a frequency of stimulation of either 11 or 22 per minute. The latter was chosen for routine use in this as well as the other instruments. It incorporates a time clock, which permits the automatic shutting off and starting of the machine at predetermined intervals. To avoid sudden shock to the patient at the beginning of each cycle of treatment, two thermo-resistors are inserted in the circuit, resulting in a slow increase of voltage at the beginning of each interval of treatment. At the rate of 22 stimuli per minute, each stimulation was shown by an oscillograph to have a duration of approximately 1.4 seconds, during which maximum impulse amplitude is delivered for about 75 per cent of the interval.

Machine B is a standard variable frequency, low voltage machine, which supplies a pulse similar in duration to that of Machine A.

Machine C has a variable frequency of 3 to 22 stimuli per minute. It also incorporates an automatic on and off arrangement permitting two types of stimulation and rest periods, namely 3 minutes stimulation and 4½ minutes rest, or 3 minutes stimulation and 12 minutes rest, each stimulation period using the predetermined frequency per minute. As contrasted with the first two instruments the individual stimuli are not sustained for any appreciable time. Build-up of amplitude progresses gradually over an interval of approximately one second. This is followed by a sharp drop to zero voltage.

A fourth machine, D, superimposes a 1000 or 2000 cycle per second on a one-half rectified 60 cycle time wave. Its automatic surge setting allows a stimulation ratio of three seconds "on" and six seconds "off," thus resulting in a frequency of seven stimuli per minute.

The effect of sinusoidal stimulation upon saphenous circulation time is summarized in table 1. Groups of patients are separated into categories based on the length of control circulation time. It is evident that the poorest results were

Table 1.—Effect of Sinusoidal Stimulation of Calf Muscles on Saphenous Circulation Time (C.T.)

| Modality  | No. of Cases | Control Mean C. T. (sec.) | Change (sec.) | Change Range (sec.) | No. of Cases with Decreased Circulation Time |
|-----------|--------------|---------------------------|---------------|---------------------|--|
| Machine A | 7            | 8-20                      | -1            | 7 to +4             | 3  |
|           | 14           | 21-40                     | -7            | 13 to +8            | 11   |
|           | 8            | 41-120                    | -24           | 75 to +73           | 6  |
|           | 4            | > 150                     | -90           | -130 to             | 0  |
| Total     | 33           |                           |               |                     | 23   |
| Machine B | 6            | 29-39                     | -12           | 3 to -22            | 5  |
| Machine C | 7            | 6-20                      | +4            | 6 to +26            | 1  |
|           | 9            | 21-40                     | +13           | 24 to +127          | 2  |
|           | 2            | 59,73                     |               | 11, +77             | 0  |
| Total     | 18           |                           |               |                     | 3  |
| Machine D | 1            | 27                        |               | +15                 | 0  |

obtained when the rate was already rapid before therapy. The most consistent reduction in time in this series was seen with Machines A and B. Machine C was comparatively ineffective in all categories. It is possible that the before mentioned variation in duration of maximum impulse amplitude may be responsible for the apparent discrepancy of results between Machines A and B on the one hand and Machine C on the other.

**Mechanical Aspects of Muscle Contraction:** The premise upon which therapy with this modality was initially based was derived from a mechanical concept<sup>2,3</sup>. It was presumed that venous circulation would be accelerated by the pumping action of the contracting leg muscles. In the course of the present work it became apparent that when saphenous time was seen to improve with

Table 2.—Circulation Time Measured During Sinusoidal Stimulation

| Case No. | Stimuli per Min. | Control Time (Sec.) | Time During Stimulation (Sec.) | Time Immediately After Stimulation |
|----------|------------------|---------------------|--------------------------------|------------------------------------|
| 53       | 22               | 48, 53, 59          | 57                             | 48                                 |
| 20       | 22               | >150, 68, 65        | 138                            |                                    |
| 122      | 24               | 22, 22              | 30                             |                                    |
|          | 132              |                     | 23, 23                         |                                    |
| 123      | 11               | 31, 30, 31          | 21                             |                                    |
|          | 26               |                     | 28                             |                                    |
|          | 56               |                     | 32                             |                                    |
|          | 132              |                     | 38                             |                                    |
| 124      | 50               | 22, 18, 19          | 24, 17                         | 17                                 |
|          | 80               |                     | 21                             | 19                                 |

such therapy the change was noted after stimulation had been applied at least five or ten minutes and, in fact, tended to be most marked immediately after cessation of treatment. It may be seen from the five cases in table 2 that circulation time was not reduced when read-

ings were made early in the course of active stimulation.

*Effect of Periodicity:* The patient with Machine D (table 1) had best control time of 27.5 seconds. This machine has a stimulation frequency of about 5-7 per minute, 3 seconds on and 6 seconds off. Five minutes treatment failed to produce a reduction in circulation time. Six additional minutes of treatment still failed to produce any improvement.

A patient with Machine A had a control circulation time of nineteen and twenty seconds respectively. With a current of 20 ma., a five minute treatment, at 11 stimuli per minute, the circulation time was reduced to fifteen seconds. After five minutes of rest, the time was twenty-five seconds. Using the same current strength of 20 ma. at twenty stimuli per minute for five minutes, the circulation time was measured at 17.5 seconds. Five additional minutes of treatment did not alter this time materially (17 seconds). Reverting to 11 stimuli per minute, the time after five minutes was still only sixteen seconds, and thirteen additional minutes with the same stimulation frequency again did not alter the value to any appreciable extent (18 seconds).

On the other hand another patient seemed to show a favorable effect from increased frequency of stimulation. With a starting time of eighteen seconds, five minutes of stimulation at eleven per minute did not alter the time. After a ten minute rest period the time did not change materially (20 seconds). Increasing the stimulation frequency to twenty-two per minute, a ten minute treatment produced a circulation time of eleven seconds. After five minutes of rest, the time was still only fifteen seconds. After ten minutes of additional rest, the circulation time was 24 seconds. Of a total of eight cases which did not respond to a frequency of 11 per minute, six also failed to respond to 22 per minute. The other two showed a response when the frequency was increased. This would suggest that the faster rate is preferable for routine use.

*Current Strength:* For the most part the treatments were given with currents of toleration which varied from 2 to 40 m.a. The usual strength was between 5 and 15 m.a. Two cases which showed no response at 2 and 5 m.a. respectively did not react when the current was doubled. On the other hand 2 of 3 which failed to respond to 10 m.a. did react favorably to 14 or 18 m.a. There were two out of three cases where three to five m.a. produced a clear cut drop in time but where an even greater effect was observed when the strength of stimulus was doubled.

*Duration of Treatment:* This varied from five to thirty minutes and averaged fifteen. In five patients who showed no response after five minutes, a prolongation of treatment to ten or even thirty minutes were ineffectual in all but one case. An effect in the latter instance was first noted after twenty minutes. Four patients showing a good effect after the first five minutes were continued for an additional ten to twenty-five minutes. Three showed no further improvement in rate of flow but in one there was progressive improvement up to fifteen minutes.

#### Effect of Heat

*Diathermy:* Five patients were treated with shortwave or microwave diathermy, either to the abdomen or to the thigh (three with the former and two with the latter). Four patients were treated with the electrode over the abdomen. Two showed a reduction in circulation time, the other two did not. With diathermy to the thigh, a reduction was obtained in the one patient tested. (table 3).

*Heat Cradle:* Six patients were treated with a heat cradle (480 watts) for ten to twenty minutes either to the lower abdomen or to the lower extremity. In two with the cradle to the abdomen there was no reduction in circulation time. With the cradle to the lower extremity all 4 patients showed a reduction in circulation time (table 3).

*Warm Moist Pads:* Seven patients were tested by the application of warm

Table 3.—Effect of Heat Upon Saphenous Circulation Time (C.T.)

|                                 | Case No. | Control C. T. (sec.) | After Therapy | Change |
|---------------------------------|----------|----------------------|---------------|--------|
| Diathermy                       |          |                      |               |        |
| Microwave to Abdomen            | 119      | >150                 | 15            | -135   |
|                                 | 115      | >150                 | >150          | 0      |
| Shortwave to Abdomen            | 146      | 35                   | 35            | 0      |
|                                 | 104      | >150                 | 15            | -135   |
| Shortwave to Thigh              | 89       | 33                   | 11            | -22    |
| Heat Cradle (480 Watts) To legs | 114      | >150                 | 11            | -139   |
|                                 | 87       | >150                 | 36            | -114   |
|                                 | 85       | >150                 | 33            | -117   |
|                                 | 84       | 20                   | 11            | -9     |
| To abdomen                      | 114      | >150                 | >150          | 0      |
|                                 | 106      | 27                   | 27            | 0      |
| Warm Moist Pad to Calf          | 106      | 26                   | 14            | -12    |
|                                 | 76       | 84                   | 35            | -49    |
|                                 | 65       | >150                 | 45            | -105   |
|                                 | 56       | 22                   | 8             | -14    |
|                                 |          | 44                   | 27            | -17    |
|                                 | 53       | 70                   | 29            | -41    |
|                                 | 40       | 19                   | 14            | -5     |
|                                 | 54       | >150                 | 58            | -92    |

moist pads to the calf. The solution consisted of a teaspoon of salt to a glass of water. The temperature ranged from 31 to 38 C. (88 to 100 F.). All patients showed a reduction of circulation time within five minutes and a maintenance of this reduction for as long as a half hour.

#### Effect of Exercise, Rhythmic Constriction and Mechanical Vibration

**Exercise:** Four patients were asked to exercise their lower extremities, from 50 to 100 times. In three this consisted of flexion of the knee or ankle with the needle held in place and lasted for approximately ten minutes. The other patient performed Burgers exercises for a similar period of time. Only in the latter was there a reduction in circulation time. The others showed an actual increase.

Table 4.—Effect of Exercise, Mechanical Vibration and Rhythmic Constriction on Saphenous Circulation Time (C.T.)

|                       | Case No. | Control C. T. (sec.) | After Therapy | Change |
|-----------------------|----------|----------------------|---------------|--------|
| Exercise: Burgers     | 78       | 43                   | 27            | -16    |
| Leg exercise          | 76       | 41                   | 84            | + 43   |
|                       | 79       | 72                   | 75            | + 3    |
| Ankle exercise        | 72       | 27                   | 32            | + 5    |
| Mechanical Vibration  | 115      | >150                 | 37            | -113   |
|                       | 116      | 30                   | 18            | -12    |
|                       | 117      | 36                   | 19            | -17    |
|                       | 118      | 15                   | 11            | -4     |
|                       | 119      | >150                 | >150          | 0      |
| Rhythmic Constriction | 94       | 10                   | 17            | + 7    |
|                       | 98       | 17                   | 17            | 0      |
|                       | 99       | 90                   | 57            | -33    |
|                       | 102      | 26                   | 70            | + 44   |

**Rhythmic Constriction:** Four patients were treated with rhythmic constriction applied either to the calf or above the knee. The pressure was fifty to seventy-five mm. of Hg., and the duration two minutes on and one minute off over an interval of nine to thirty minutes. One of three treated over the calf showed a reduction in circulation time. One treated over the thigh failed to respond.

**Mechanical Vibration:** Five patients were treated with mechanical vibration applied with a conventional electric vibrator for five minutes to the calf. Four showed a reduction in circulation time.

#### Discussion

With regard to differentiating between different machines supplying sinusoidal stimulation, the tests indicate that a stimulation frequency of around twenty-two per minute can be expected to reduce saphenous circulation time in the majority of patients when the current is sufficient for a mild contraction and is applied for intervals of five to ten minutes, followed by a similar rest period. It would appear that a machine supplying a stimulus sustained at full voltage for about  $1\frac{1}{2}$  seconds is superior to one which gives a shorter one.

In a previous report<sup>8</sup> using sodium cyanide as a test medium, it was shown that sinusoidal stimulation reduced circulation time. However, no differentiation was made between various sinusoidal machines as to their efficacy, nor could an explanation definitely be given for the mode of action of this modality. It was thought that sinusoidal stimulation reduced circulation time through its pumping action of calf muscles. The present evidence would indicate that the metabolic demands of muscular contraction also play a part. Saphenous flow is seen to be accelerated immediately after therapy rather than during the rhythmic stimulation. Thus the locus of action undoubtedly lies within the arterioles and capillaries, which, because of their dilatation, tend to feed more blood into the venous channels. Compatible with the notion that pre-venous flow is important are the observations made on

two cases after unilateral lumbar sympathectomy. Venous flow was very rapid in the operated side and quite slow in the opposite leg. Moreover, in view of the demonstration of positive effects from various forms of heat and mechanical vibration further emphasis is directed toward the importance of pre-venous vascular dilatation. The effect of a variety of physical modalities on the latter is well known.

In spite of these conclusions it would not be justifiable to discard the concept of direct mechanical pumping of venous blood by sinusoidal stimulation. Deep lying venous channels are undoubtedly compressed by the muscular contraction. Promotion of blood flow through them alone would not be detected by measurement of saphenous circulation time if, as is possible, a great share of the blood from the dorsal vein of the foot reaches the femoral area via superficial pathways. It cannot be deduced, therefore, that other modalities which reduce saphenous time are equally efficacious for the prevention of venous thrombosis. This must await either further evidence from experimental procedures designed to measure specifically the deep venous blood flow as affected by mechanical versus thermal modalities or from a statistical comparison of clinical results with the two methods in the prophylaxis of venous thrombosis. Likewise, although a more rapid saphenous flow was obtained after certain types of sinusoidal stimulation than after others, this does not necessarily predict the relative efficacy of the various machines for the mechanical propulsion of blood in deep venous channels.

In a series of fifty normal males studied by Wright, Osborn and Edmonds<sup>6</sup> in which the venous time from foot to groin was determined with radioactive sodium ( $\text{Na}^{24}$ ), no values greater than forty-seven seconds were observed. An unexpected development resulting from the present work was the occasional observation of extremely slow venous flow, i.e., no endpoint after two and sometimes three or more minutes. This was noted in some patients without any evi-

dence of arterial or venous disease. The fact that the radioactive material remained near the site of injection could be confirmed either by placement of the counter over this region, or by flushing the needle with saline. After the latter procedure the material would move promptly to the femoral vein at the groin. Failure of blood to leave the dorsal vein of the foot could be due either to an extremely slow rate of flow through all venous channels of the foot or to the fact that the main stream of blood bypasses the dorsal vein. The latter seems most likely. Nevertheless, the fact that the rate of venous flow in toto is reflected by the rate of transport from the vein receiving the injection is indicated by the sharp reduction of time in most of these cases after various physical modalities are applied.

#### Summary and Conclusions

One hundred and twenty-two patients were tested for the effect of various physical modalities upon saphenous circulation time. The modalities used were sinusoidal stimulation, shortwave diathermy, microwave diathermy, body baking, moist heat, leg exercises, rhythmic constriction, and vibration.

An evaluation has been made of various types of sinusoidal stimulation and the effect of modifications in the techniques of application.

The most consistent improvement (i.e., reduction) in circulation time with sinusoidal stimulation was seen in those patients who had a high control value to start with, namely over twenty seconds. Various forms of heat and mechanical vibration to the calf were in many instances just as effective as sinusoidal stimulation.

It is concluded that a variety of physical modalities are capable of reducing saphenous circulation time and that the mechanism involved in all cases includes a component of acceleration due to arteriolar and capillary dilatation.

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### Discussion

Dr. Emil J. C. Hildenbrand (Washington, D. C.): I have enjoyed hearing this paper, but have not had the opportunity of reading it. I have had the opportunity to check the data on which the paper is based. I must confess I know very little about saphenous circulation time and to my knowledge there is little in the literature except for the reports of the author.

Circulation time, or the time taken by a drop of blood to travel between two points in the circulation, has been determined by a variety of methods all depending on the time required for a drop of some substance injected into one vessel to appear in the blood of another; the most recent of these methods being the use of radioactive tracers. It is of this type that this paper is concerned.

To determine the total circulation time the following must be known: 1. Average amount of blood passing by each part in a given time, and 2. the average circulation time of each part. These computations are obviously subject to considerable error. The terms circulation time and velocity of blood flow are used almost interchangeably. Certain factors influence the accuracy of any circulation time—variability of the capacity of the vascular bed, the influence of the vasomotor system and the extent of the patency of the capillaries.

The intravenous solutions used have their effect on circulation time. It has been proved as concerns the antibiotics—for example, terramycin causes a decrease in peripheral blood flow and arterial pressure. Penicillin had no effect even in high concentration, and streptomycin caused increased blood flow.

The *vis a tergo* must be considered as the basic cause for the movement of the venous blood near the periphery. As the vessels get larger, two other factors come into play, the massaging influence of the muscles, and the valves of the veins. By the movements of the muscles the veins which lie between will be rhythmically compressed, and this will tend to cause the blood to be moved forward and backward in them, the backward movement being, however, prevented by the operation of the valves. When the tonicity of the muscles is subnormal, as in conditions of ill health, the absence of this massaging action permits the blood to stagnate in the veins with the consequence that the veins become dilated and varicose.

The author attempts to prove the efficiency of several modalities. The paper and work have definite scientific research value if one takes into account some of the possible inaccuracies due to the variables encountered in the determination of circulation time. It was noted in the cases shown that some showed improvement in circulation time and others did not. Originally this work was primarily sponsored to determine whether it would lessen the thrombo-embolic problem. Unfortunately not enough cases have appeared to alter statistics and then, too, we surgeons have somewhat changed our thought in that we now do not believe that early ambulation has any marked influence in prevention of thrombo-embolism. This thrombo-embolism and circulation time are still questions; much has been learned and done but certainly there is still much to do experimentally and clinically and it may be that work like this (in which a segment of the venous system is being studied) will bring us nearer to the solution.

# PROSTHETIC TRAINING FOR THE UPPER EXTREMITY AMPUTEE WITH CINEPLASTY\*

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## Historical Developments

Amputations are ageless, but the use of a prosthetic device to replace a missing part of an upper extremity is a relatively new development. The first functional devices were built in the fifteenth and sixteenth centuries.<sup>1</sup> These were necessarily crude and were usually operated by a system of springs. Refinements rapidly appeared; but in spite of the most elaborate artificial hands made, it is generally recorded that those associated with the problem were dissatisfied with the results, because intimate control of this prosthetic hand could never be achieved.

The first idea of actually uniting the tendons of an amputated stump to artificial tendons of a prosthetic hand was recorded in Paris in the year 1867, although there is no material available to indicate that such an idea was carried out on a living patient. Vanghetti published material from Italy in 1898<sup>2,3,4</sup> which was also concerned with this idea, and a further publication (1899) indicated that from experimental results it would seem possible to transmit movement of muscle in an amputation stump to a prosthetic device.

Ceci, of Pisa, completed the first three recorded cineplastic operations of the upper extremity in 1906. There were scattered reports of somewhat similar procedures in subsequent years, but with only slight general interest on the part of the surgeons. In dealing with his methods of rehabilitating German war wounded, Sauerbruch, a German sur-

geon,<sup>5,6</sup> reported in 1916 what was, and is, probably the most complete evaluation of the cineplastic procedure. This work was followed in 1923 by a second volume, with further physiological and anatomical elaboration. No further great strides were evident in this field until World War II, although scattered reports continued from many European and South American countries. However, even during the early portion of that conflict there were many who continued to doubt the feasibility of such a procedure. The reasons for this lack of enthusiasm are quite well summarized by the authors of the Oxford War Manual on Amputations and Artificial Limbs, London, 1942, who believed the cineplasty to be a failure, not only because of poor muscle excursion, but because prosthetists could not fabricate a satisfactory device for the cineplasty patient.

Kessler,<sup>4,6,8</sup> in his rehabilitation work in the Navy during World War II, introduced to this country the first large number of practical cineplasty operations. His work, together with that done by Spittler,<sup>7</sup> Alldredge, the University of California Group, and others, has done much to clarify the physiological considerations, reduce the many surgical complications which resulted in previous reports of failure and finally make the procedure definitely worthwhile in rehabilitating selected upper extremity amputees. Research in the problem of providing satisfactory prostheses and terminal devices is now progressing rapidly, and this is certainly responsible, in part, for the successful present day cineplastic muscle tunnel.

Surgical techniques and prosthetic devices *per se* are not the concern of this paper; it is rather, the functional

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result of the union of these potentials. Patient and prosthesis supplement one another; but without adequate training, the end result, even today, leaves much to be desired.

#### **Previous Training Efforts for the Cineplasty Amputee**

While much has been written on the actual operative procedures of the various types of cineplasty and the numerous mechanical devices available to harness the power produced by the operation, there is relatively little available material concerning the actual training of these patients in the proper use of the prosthesis. This was especially true before World War II. The refinement in operative techniques and prostheses produced the first attempts to set down the details necessary to complete the final stages of rehabilitation. Sauerbruch, in his 1923 volume, mentions the necessity for training, both preoperatively and postoperatively, but is primarily concerned with the actual building of strength and excursions in the tunnel or tunnels. Later workers tend to follow this line of reasoning; this is entirely justified, for without adequate strength and excursions, the tunnel is worthless. Recent publications continue to stress this point with elaboration of techniques of muscle strengthening. Few, however, have gone into the final technique of training in the use of the prosthesis.

It is true that an occasional amputee with a cineplastic tunnel which has good excursion and adequate strength is capable of putting on a prosthesis for the first time and snapping his hook or hand open and shut quite vigorously to the satisfaction of the surgeon and the prosthetist. Given sufficient time, he may eventually utilize his device fairly well if he does not become discouraged in the process and hang his prosthesis in a closet. However, time is of the utmost importance to the amputee. He has lost time recovering from the amputation as well as from the operation necessary to form the tunnel. He must be trained adequately and rapidly if this loss of time is to be proved worthwhile to him.

This problem makes prosthetic training of the utmost importance.

This paper will explain one method of complete training, preoperative and postoperative, preprosthetic and prosthetic, and the reasons for this program which is currently in use at Walter Reed Army Hospital. It should be emphasized that no one person — the surgeon, the prosthetist, the engineer, the physiatrist, or the therapist — can function alone in this program.

#### **Psychological Aspects of the Need for Training**

The primary psychological problem in the upper extremity amputee, at least from the physiatrist's point of view, is that of providing early and adequate orientation to the problems he will face, and plans for overcoming or compensating for the loss he has suffered. It must be realized that this should be done as early as possible, and certainly before amputation, when surgery is elective. Traumatic and emergency amputations present a special problem. These patients should be visited by the physiatrist as soon after admission to the hospital as is medically feasible. Each hour the patient spends alone is time lost in training and ultimately in rehabilitation. The longer the patient is allowed to stare at the "empty sleeve" the more each unsolved problem and each unanswered question becomes magnified and perhaps ultimately insurmountable.

Probably the greatest fear the upper extremity amputee has is that of economic loss, although this can be speculation only, since no adequate psychological study has been made to establish this fact. The service hospitals very definitely aid the patient in this respect, since the common practice is to group the amputee patients in various states of rehabilitation on one ward, so that the new patient need only look around him to see others using prostheses with relative ease or to hear the various phases of training being discussed. He can see others in his own predicament who are again two-handed and who have good economic prospects. The civilian amputee may be

the only amputee in his hospital. Confined in a private or semiprivate room, receiving only the sympathetic condolences of friends or relatives, he may have nothing to fill his time but the distorted visions of amputees he has known or heard about.

The psychological problems of training for rehabilitation are not resolved when the new amputee sees others around him who have lost an arm. Early informal talks by the surgeon who has done the amputation and the physiatrist who will be responsible for the training of the patient are essential. Ample time for answering the many questions which are of concern to the patient can never be replaced by simply allowing him to see another amputee. The new amputee will wish to know how long he will be in the hospital, what kind of a prosthesis he will wear, what the cost will be, where he will get it, who will teach him how to use it, how long it will take him to learn how to use it, and above all else, what will he be able to do after he has received his prosthesis. These questions are by no means unfamiliar to any medical person who has worked with an upper extremity amputee, nor are they confined to civilian patients only. All amputees have similar problems regarding their futures. Early and frequent visits to the patient, even before any actual training can be done, will aid the physiatrist in informal planning of the patient's program, and, if necessary, vocational retraining can be outlined.

When the operation is not an emergency and the patient can be seen prior to amputation, these same questions will arise. The physiatrist must therefore fortify himself by previous study of the patient's status and proposed surgery by consulting with the referring surgeon. A visit to the rehabilitation clinic is definitely indicated for these patients, as well as for those who could not be contacted before surgery, for the purpose of acquainting them with the facilities which will be available to them and of which only a negligible number are aware of their existence.

When the patient starts his actual training, he must be told why each in-

dividual step is necessary. There is no excuse for the patient merely to be seen in cursory consultation, started on a program, then perhaps to be visited by his physician again for a daily greeting until he is ready for discharge. Personal interest in each patient, from the initial bedside meeting through each phase of training, must be maintained. Questions will continue to arise with surprising regularity and the same question may be asked again and again. This need for regular follow-up is particularly evident in the preprosthetic phase of training. There is general agreement now that this is equally as important as actual prosthetic training if satisfactory results are to be expected; the physiatrist must realize that the patient sees little day-to-day gain during this period, and the question "Why must I do all this?" will occur repeatedly. The therapists concerned must also be aware of the amputee's feeling in this problem so that his patience will not be lost. This factor is of particular concern to those in civilian practice, where each day of training, frequently as an outpatient, means an added expenditure; and unless adequate reason for this expenditure is given, patient interest and cooperation will be lost.

When the surgeon and the physiatrist agree that a cineplastic tunnel will aid the patient's rehabilitation, further problems become evident. The patient will quite naturally wonder if the time required and the discomfort suffered by additional surgery will be justified by the results. He should, if possible, see and talk to other patients with a cineplastic tunnel. All reasons for, and advantages of, the procedure should be explained and ample time given for the patient to consider them. Many minor reasons why a patient may not accept a cineplasty will become evident. These should be anticipated, if possible, and resolved when the procedure is first proposed. Among these are: cosmetic effect, possible tunnel damage, and care of the tunnel. Regardless of how much the rehabilitation team believes a cineplasty to be indicated, no great pressure should be brought to bear on the patient to accept it. It is far better to train the patient for

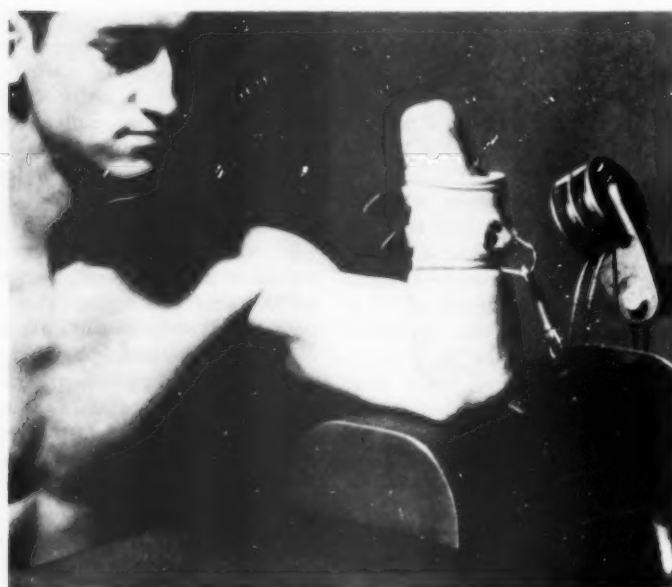


Fig. 1 — Progressive resistive exercises to strengthen biceps muscle pre-operatively.

a conventional prosthesis, and if his limitations prove as great as expected or if he voluntarily requests it, the procedure can be carried out at a later date.

#### Prosthetic Training—Physical Therapy

Preoperatively the upper extremity amputee who is to have a cineplastic operation performed is treated in much the same manner as the amputee who is to be fitted with a conventional prosthesis. When the patient is first referred by the surgeon to the Physical Medicine Rehabilitation Service, range of motion measurements of all remaining joints of the extremity are made and a gross muscle test is done. This is carried out so that progress may be more satisfactorily determined by the physiatrist and the surgeon during the time the patient is receiving treatment, and to disclose any marked weakness or lack of joint motion which needs to be corrected. A check of body alignment and posture is also made at this time, since frequently the upper extremity amputee has a tendency to carry the shoulder on the amputated side high because of the change in the center of gravity of the body.<sup>8</sup> Postural

deviations (scoliosis, forward head or rounding of the shoulders) are noted and the patient is given postural exercises to correct and/or prevent deformities.

A daily exercise program is started, including exercise to increase the range of motion of the remaining joints and to strengthen all remaining muscle groups of the extremity. These exercises usually progress from active to manual-resistive and, when possible, to progressive-resistive exercises. Particular attention is given to strengthening the muscle which is to be used for the motor tunnel. The below-elbow amputee who is to have a biceps tunnel can usually be given progressive-resistive exercises<sup>9</sup> by means of a cuff around the stump, attached to a system of pulleys and weights (fig. 1). It is also usually possible to give these exercises to the above elbow amputee who is to have a pectoral tunnel by modification of the same method. The above-elbow amputee who is to have a biceps tunnel must depend upon static contractions of the biceps and work in flexion of the humerus to maintain muscle tone. The patient who has a shoulder disarti-

ulation and who is to have a pectoral tunnel is also given static contractions of the pectoralis; manual resistance can be given while the patient protracts or cups the shoulder.

During the preoperative period, the stump is bandaged with an elastic bandage to encourage shrinkage. Usually a 3 inch Ace-type bandage is most satisfactory. Care must be taken to apply the bandage evenly, with somewhat greater pressure distally than proximally to eliminate choking the stump. The bandage should always extend as close to the proximal joint as possible without limiting motion in that joint. The patient is carefully instructed in static contraction of the muscle to be used for the tunnel so that he may start exercise after surgery and before it is possible to give active or resistive exercises, and also so that he may be able immediately to isolate this muscle without action or motion of the stump.

The patient usually enters the postoperative training period about three weeks after operation. Tunnel care and hygiene is then instituted. Depending on the condition of the operative site, ultraviolet light may be given to aid in superficial bacteriostasis and healing. The tunnel is cleansed daily with Hexachlorophene (Hisohex®).<sup>10</sup> The plastic peg inserted into the tunnel by the surgeon at the time of suture removal is also cleansed in the same manner (fig. 2).

Manual resistance for the tunnel is started as soon as healing permits. When the operative site is completely healed, a permanent custom fitted tunnel pin is inserted through the canal and more vigorous exercise of the tunnel permitted. A four-inch metal bar, with short cables attached to both ends and equipped with connectors to allow union with the pin, enables the physical therapist to give better graded resistance than is possible with the lucite peg alone (fig. 3).

When the permanent peg is inserted into the tunnel, the patient may be fitted with an exerciser previously prescribed by the Prosthetic Prescription Committee.<sup>\*\*</sup> This exerciser consists of a simple socket and a cable system which con-

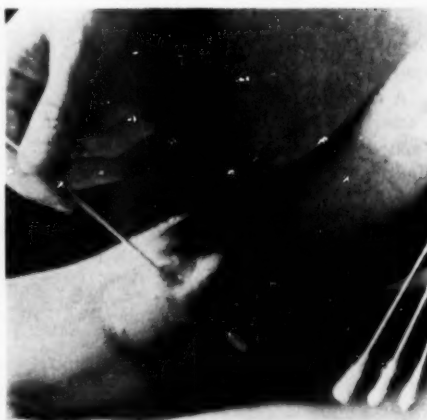


Fig. 2—Daily cleaning of tunnel with Hexachlorophene solution followed by careful drying.

nects the tunnel to the socket (fig. 4). This device permits the patient at any time to exercise the tunnel against resistance, which can be increased by adding more rubber bands; and since not only the strength of the muscle tunnel is important, but also the excursion through which the tunnel moves, resis-



Fig. 3 — Manually applied tunnel resistance through adaptive handle and cables to the tunnel pin.

<sup>\*\*</sup>A group of physical rehabilitation experts—an orthopedist, a physiatrist, a prosthetist, prosthetic research engineers, therapists and technicians—which meets at stated intervals to discuss and prescribe prostheses for amputees with or without cineplasty, to study amputee patients already fitted as well as to review engineering developments in the field of prosthetic research. Its geographical and physical location permits close integration with other similar groups, including the Advisory Committee on Artificial Limbs of the National Research Council.

tive exercises which place some stretch on the tunnel during exercise are required.

A device similar to the manual tunnel exerciser has been devised. It can be attached to the DeLorme progressive resistive exercise table, or to an ordinary pulley with graduated weights in order to give progressive resistive exercise to the tunnel (fig. 5). During this postoperative treatment period, the program of exercises for maintaining joint motion, correct body alignment and strength of muscles of the entire extremity is carried on in addition to the care of the tunnel.

#### Prosthetic Training—Occupational Therapy

Three problems are considered during the preprosthetic training period: first, that of re-educating the remaining hand, particularly when it is the subdominate one; second, a basic muscle strengthening program designed to prepare the patient to operate the prosthesis and gain maximum benefits from its use; and third, methods to keep the patient thinking in terms of again being a two-handed person, by applying the use of projects and skills which stress bilateral or two-handed activities.

Educating the patient to use the subdominate hand requires that gross movements be taught initially, with progression to the finer, more dexterous motions. Such activities as handwriting, printing, and lapidary work are used to develop this function.

Activities such as woodworking and ceramics are adapted to muscle strengthening techniques by using the amputation stump as an assistant to the remaining arm. This method aids in improving muscle coordination as well as muscle strength. These basic motions carry over to aid in activating the prosthesis, since operating the terminal device, locking and unlocking the elbow, and total positioning of the prosthesis are partially dependent upon the shoulder motion of the amputated extremity. This dependency increases directly with the level of amputation.

The kinesthetic sense is almost completely lost to the amputee when he is fitted with a prosthesis. The use of clay in kneading and molding a ceramic piece helps to toughen and strengthen the stump, as well as to stimulate and maintain the interest of the patient by providing that sense of feeling presumed to be lost. Further, new muscle groups are utilized to aid in controlling the prosthesis

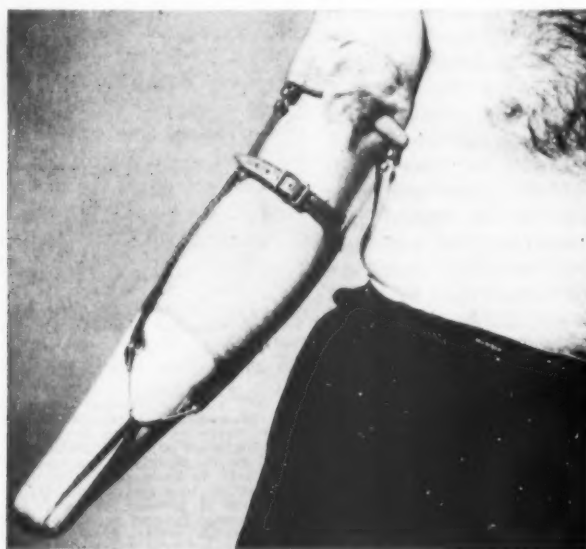


Fig. 4—Special exerciser in use.



Fig. 5—Progressive resistive exercise for the tunnel through the permanent tunnel pin and adapter cables to the DeLorme Table.

by retraining and increasing this sense of positioning.

Prosthetic training begins by teaching the patient the basic mechanics necessary to operate the prosthesis. Resistive exercises for strengthening muscles and increasing range of motion have been given in both Physical and Occupational Therapy, so the fundamental patterns are well established. Operating the mechanical parts of the prosthesis plays only a small role in the training of the amputee.

Bilateral or two-handed activities encourage the patient to learn to use the prosthesis as an assistant or helping hand. Training the amputee in the habitual use of the prosthesis demands that the prosthesis fit perfectly and frequent adjustments should be anticipated. The amputee must be given adequate and supervised training by a specialist in that field so that he may receive the maximum benefits from using the prosthesis as early as possible, thus avoiding clumsy movements which might tend to become fixed and thus discourage full use.

Applying the basic mechanics of the prosthesis to the activities of daily living

is the next step in training. This has been greatly facilitated by the cineplastic muscle tunnel motor. The patient is taught to use the canalized muscle with discrimination; the Army Prosthetics Research Laboratory hook gives selected prehension, particularly in learning to grasp, place, and release different sizes, shapes, and weights of objects. The cineplasty patient's sphere of action is much greater than that of the conventionally fitted patient (fig. 6). He is able to operate the terminal device more efficiently at higher and lower levels; and operations close to the body are more normal in appearance and action. The mode of action (pulling, pushing, turning) is improved, less energy is expended, and the patient is able to perform with more speed and ease in a shorter period of time.

The use of frequent testing or achievement scaling has been discontinued. The therapist observes each patient in his daily training, and guides him into those channels in which his efforts lag or are limited. A single achievement evaluation is made by the therapist, usually without the knowledge of the patient, as he nears

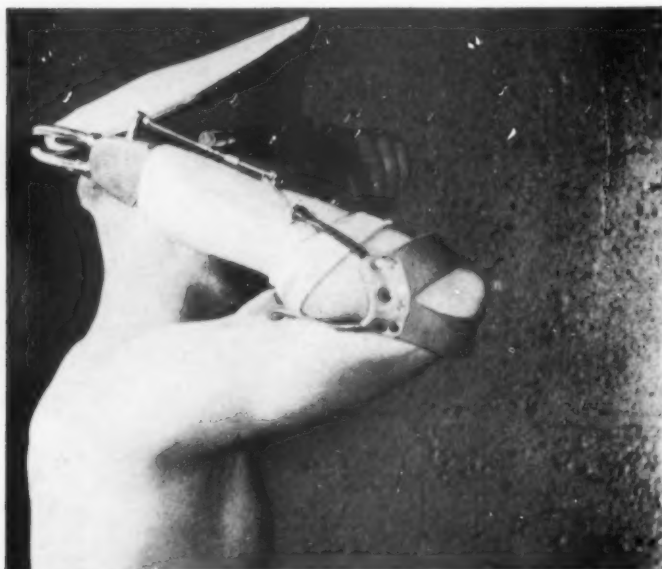


Fig. 6—An increased sphere of action is available to the patient with cineplasty. The conventionally fitted amputee is usually unable to operate the terminal device behind the head.

the conclusion of his training in the use of the prosthesis, so that a record for future study may be available.

#### Prosthetic Training—Vocational Aspects

Vocational training *per se* is not given to patients of the Armed Forces Medical Services, since the present policies call for this training to be supplied by the Veterans Administration when needed. This fact in no way detracts from the importance of this stage of total rehabilitation or suggests that the Medical Services feel that it is not necessary. Vocational guidance and training cannot be neglected if the problems set forth earlier are met and conquered. Prosthetic training at Walter Reed Army Hospital prepares the amputee to manage capably the so-called "activities of daily living" within his limits. Insofar as possible, efforts are made to help him to prepare for the vocation which he may select while in the hospital, or to return to his former one. Total vocational rehabilitation, however, is concerned not alone with training the amputee for a job, but more importantly, with the counseling and testing which

will aid him in selecting a position for which training is possible. This testing and counseling, within the limits indicated by the extent of amputation and whether or not the dominate hand was lost, should be started as soon as the patient is physically capable. Initial vocational counseling should lay the groundwork for careful planning by the patient. Broad spectrum testing can then be carried out so that all concerned may be supplied with a job pattern which is not only interesting to the patient, but is also within his physical and mental capabilities. Further counseling and testing is necessary to narrow these prospects down to the proper level.

It must be emphasized that training, with the basis of the vocational tests and interviews in mind, should never be directed to a specific job, but should attempt to encompass the patient's total potentialities as well as his interests. Particularly is this true in the case of a young patient, for it is grossly unfair to train him for a single job and expect him to retain it for the rest of his life. Finally, job placement must be accomplished for

all those who of necessity have had to change occupations as the result of an amputated upper extremity. Facilities for this are becoming increasingly available and should be utilized whenever possible, preferably before the patient leaves the hospital.

### Summary

A technique for training the upper extremity amputee with a cineplastic muscle tunnel motor has been presented, encompassing both physical therapy and occupational therapy. Physical therapy in the preoperative course includes activities aimed toward regaining and maintaining full range of motion in the remaining joints of the involved extremity, and exercise to strengthen and develop the muscle which is to be tunneled. The post-operative course includes tunnel hygiene and graded manual resistance to strengthen and increase excursion of the muscle tunnel. Prior to the prosthesis, occupational therapy is concerned with educating the remaining hand, developing kinesthetic sense in the stump, and further strengthening the involved extremity by adaptive devices. Prosthetic training develops from teaching the basic mechanics of the prosthesis through two-handed operation to the activities of daily living. Historical notes, as well as a brief discussion of the psychological aspects of training are also included.

### Conclusions

1. Orientation of the amputee to a rehabilitation program must be rapid, complete, and continually available, and should include surgical as well as training aspects. Personal interest of the surgeon, the physiatrist, and the therapist is essential to adequate orientation.

2. The prosthetist and the prosthetic engineer have combined their skills to develop new and simpler but more efficient prostheses and terminal devices. These developments have enhanced amputee rehabilitation, and continuing research indicates even greater engineering and fitting perfection.

3. The "team" approach is essential to the total rehabilitation of the arm ampu-

tee. No single specialist, surgeon, physiatrist, prosthetist or therapist can alone assume the responsibility for an adequate training program. Complete cooperation between all groups is essential to the rapid and total rehabilitation of these patients. The physiatrist should assume the added responsibility for the coordination and integration of this group of specialists. The reward should be an acceptable, usable prosthesis for all arm amputees thus reducing the problem of "the empty sleeve."

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### Discussion

Dr. John H. Aldes (Los Angeles): Col. Kuitert and Capt. Vultee have emphasized the value of team work in rehabilitating the upper extremity amputee. They have shown that the patient's good psychological approach to his con-

dition and training, and his understanding of the whole program are necessary for successful rehabilitation. My experience in rehabilitating the upper extremity amputee follows the same pattern. For the amputee having a cineplasty, exercise and training of the stump and tunnel play a large part in obtaining a satisfactory end result.

Pre-operative rehabilitation should be started far in advance of surgery; and once the decision to have a cineplasty has been made, not only must the involved muscle be strengthened, but the entire body mechanics must be considered. The most successful cineplasty would be a failure unless the stump, the involved muscle, and the entire body are put into the best possible physical condition. Heavy resistant exercises are of great value to obtain increased muscle tone prior to surgery. In the pre-operative training, the patient must be instructed in static contractures of the muscle to be used for the tunnel; this not only helps to increase the tone of the involved muscle, but also teaches the patient one of his post-operative procedures. During the presurgical phase of rehabilitation is the best time to re-educate the patient in: one, the activity of his normal hand and arm, particularly when it is the sub-dominant one; two, the basic muscle strengthening program which will prepare the patient to oper-

ate his prosthesis; and three, teaching the patient to think of himself as a normal person with two hands. The patient should become familiar with the mechanics of the prosthesis he will wear. Also, this is the proper time for vocational advisement.

In the post-operative phase, tunnel care and the static contractures of the tunnelized muscle are the first activities of the patient. The program of manual resistance for the tunnel as well as for the involved extremity is gradually increased, in direct proportion to the speed of healing of the operative site. The authors' device for tunnel exercising which may be attached to the DeLorme progressive resistive table, or to an ordinary pulley with graduated weights, is advantageous in obtaining good muscle tone of the tunnelized muscle.

What I call "the amputation depression phase," which we see in the post-operative stage, is greatly decreased if activities as near normal as possible are introduced early in the post-operative program. The rehabilitation program outlined by the authors, will result in eliminating the situation where the amputee becomes discouraged and hangs his prosthesis in the closet and will provide an amputee who is satisfied with his prosthesis and uses it in a normal physiological manner.

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## IMPORTANT NOTICE —

The Second Annual Meeting of the VA Area Consultants

is scheduled for Sunday, August 30, 1953,

Palmer House, Chicago.

# EDITORIAL

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION  
OFFICIAL JOURNAL

*American Congress of Physical Medicine and Rehabilitation*  
*American Society of Physical Medicine and Rehabilitation*



## STATISTICS IN PHYSICAL MEDICINE AND REHABILITATION

What constitutes a treatment in physical or occupational therapy? As physiatrists, we are responsible for the technical and administrative supervision of Physical Medicine and Rehabilitation Services and are therefore in a position to develop uniform standards in the reporting of the activities of our departments. Recent developments in the field of physical medicine and rehabilitation have led to considerable expansion in the services rendered by physical and occupational therapists in hospitals and treatment centers. There has developed considerable diversity in the types of services rendered and in the statistical reporting of these services. Consequently, much confusion has arisen in the interpretation of case load and treatment statistics.

The variables in any specific treatment are the duration and extent of therapy. The word extent is used advisedly because in many instances, particularly in functional rehabilitation, the various modalities play a minor role from the statistical point of view. A complicating factor is the consideration of group therapy as utilized under certain circumstances. A patient with a Colles' fracture may receive whirlpool baths, massage and active exercises with

some passive activities where indicated. Another individual with an osteoarthritis of the spine may receive diathermy only. One severely involved poliomyelitis patient may receive intensive muscle re-education and stretching while another requires resistive exercises to an isolated anterior tibial muscle. Compare the time and effort required in the postoperative mobilization of a finger following a tenorrhaphy of a severed flexor tendon with the prolonged and involved activities required in one treatment of a rheumatoid arthritic or hemiplegic patient. Several colleagues, asked to interpret similar treatments from a statistical point of view, differ widely in their thinking.

The picture is further complicated when one considers the various functional training activities. Should each functional activity be listed individually or should they be grouped under the heading of Activities of Daily Living? In many institutions, group therapy is used extensively while in others where the case load is smaller, one therapist carries the patient through all the functional activities. One therapist might ambulate several patients in a group during one hour, or administer a similar number of diathermy treatments, but

ambulate only one paraplegic child during the same time.

The situation is even more involved in evaluating various occupational therapy treatments. The extent of the participation of the occupational therapist in the individual treatment is difficult to report objectively. This is particularly true when comparing case loads in a psychiatric hospital with those in a rehabilitation center. How should one report diversional activities in a tuberculosis institution as contrasted with functional occupational therapy directed toward mobilization of the shoulder in a thoracoplasty patient? If an accurate and complete prescription is written for functional therapy directed toward certain upper extremity segments, especially in children, it takes considerably more supervision. For example, a poliomyelitis patient with a weak deltoid and opponens must be watched closely to prevent shoulder hiking and thumb flex-

ion (assuming one is anticipating improvement, rather than trying to develop a substitution pattern). How should one record the time devoted to making hand splints and self-aid devices or to the preparation of various working materials for the following day?

These are but a few of the many variations which tend to prevent any reliable comparison of case load or treatment statistics. It might be well, therefore, for the American Congress of Physical Medicine and Rehabilitation to take the initiative and develop certain uniform standards in the reporting of therapy treatments in order that the statistics might more accurately reflect the activities of the personnel concerned.

*Eugene Moskowitz, M.D.*

*Director, Physical Medicine and  
Rehabilitation  
Grasslands Hospital  
Valhalla, New York*

## MEDICAL NEWS

*Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.*

### PERSONALS

**John H. Aldes**, Los Angeles, spoke on "New Trends in Rehabilitation" at the California Chapter Meeting of the American College of Chest Physicians on May 27.—**Lenox D. Baker**, Durham, N. C., is author of the article "Pott's Fractures and Associate Injuries," appearing in a recent issue of THE JOURNAL OF THE FLORIDA MEDICAL ASSOCIATION.—**Herman J. Bearzy**, Dayton, Ohio, spoke on "Your Child and Poliomyelitis" at the Medical Forum sponsored by the Montgomery County Medical Society and the Dayton Daily News on May 13.—**Robert L. Bennett**, Warm Springs,

Ga., gave a demonstration of splinting of the upper extremity, at a combined meeting of the Georgia Occupational Therapy Association and the Georgia Chapter of the American Physical Therapy Association. Dr. Bennett is serving on the Advisory Committee to the Editorial Staff of the AMERICAN JOURNAL OF OCCUPATIONAL THERAPY; as consultant in Physical Medicine and Rehabilitation to the Surgeon General, Department of the Army, Dr. Bennett recently visited Brooke Army Hospital at Fort Sam Houston, Texas.—**Louis P. Britt**, formerly of Warm Springs, Ga., is chief of physical medicine and rehabilitation at the Campbell Clinic, Memphis, Tenn.—**Anthony C. Cipollaro**, New York City, spoke on "Radia-

tion Therapy of Some Dermatologic Disorders" and "Cutaneous Manifestations of Systemic Disorders" at the annual meeting of the Massachusetts Medical Society.—**James M. Converse**, Williamsport, Pa., is Secretary-Treasurer of the Pennsylvania Radiological Society.—**Donald A. Covalt**, New York City, spoke on "Rehabilitation of the Patient with Hemiplegia" at the Summit County Medical Society in Akron, Ohio, on April 7; on April 9, as consultant in Physical Medicine and Rehabilitation to the Surgeon General of the United States Air Force, Dr. Covalt visited the Air Force Hospital at Montgomery, Ala.

**Michael M. Dacso**, New York City, has been appointed to the Medical Advisory Board of the New York Occupational Therapy Association.—**Earl C. Elkins**, Rochester, Minn., as consultant in Physical Medicine and Rehabilitation to the Surgeon General, Department of the Army, recently visited Brooke Army Hospital at Fort Sam Houston, Texas.—**Irvin F. Hummon, Jr.**, Chicago, was one of the co-sponsors of the scientific exhibit "Contact Roentgen Radiation of Accessible Neoplasms" at the annual meeting of the Illinois State Medical Society.—**Eugene L. Jewett**, Orlando, Fla., attended the meeting of the Southeastern Surgical Congress held in Louisville, Ky., last March.—**Arthur C. Jones**, Portland, Ore., is serving as a Fellow on the Board of Management of the American Occupational Therapy Association.—**A. B. C. Knudson**, Washington, D. C., presented the paper "Reduction of Restraint Through Activity Programs of the Veterans Administration" at the annual convention of the American Psychiatric Association at Los Angeles. Dr. Knudson is a Fellow of the American Psychiatric Association.—**Joseph Koczur**, Chicago, was one of the co-sponsors of the scientific exhibit "A Group Approach to Cerebral Palsy" at the annual meeting of the Illinois State Medical Society.—**Frederic J. Kottke**, Minneapolis, was guest speaker at the annual meeting of the Isanti County Public Health Nursing Service at Braham, Minn., on February 11. Dr. Kottke presented a lecture on rehabilitation of patients suffering from crippling diseases such as arthritis, polio and spastic palsy.—**Frank H. Krusen**, Rochester, Minn., presented the topic "Rehabilitation in Management of Arthritis" at the annual clinic day and reunion of the Wayne University College of Medicine Alumni Association on May 13 at Detroit.—**Lt. Col. John H. Kuitert**, Washington, D. C., will be transferred to Brooke Army Hospital as Chief of the Physical Medicine Service and Director, Physical Medicine Department, Medical Field Service School. Col. Kuitert was previously Chief of the Physical Medicine Service at Walter Reed Army Hospital.

**Murray M. Mahl**, formerly of Brooklyn, N. Y., is now on active duty with the U. S. Army.—**James L. McCartney**, Garden City, N. Y., is author of the novel "Frustrated Martyr." The story is based on the life of Dr. McCartney's father who started the first hospital in Chungking, China and practiced in that city until his death in 1928.—**Louis B. Newman**, Hines, Ill., addressed the Medical Staff at the Highland Park Hospital on April 18. Dr. Newman gave an illustrated lecture on "Physical Medicine and Rehabilitation as Part of Total Medical Care."—**Raoul C. Psaki**, San Francisco, is one of the co-authors of the article "Gait Training for the Above-the-Knee Amputee" appearing in the September, 1952 issue of the U. S. ARMED FORCES MEDICAL JOURNAL.—**Arthur A. Rodriguez** and **Joseph Koczur**, Chicago, conducted a Rehabilitation Clinic Demonstration for the Chicago Medical Society on March 4. The clinic featured clinical electromyography, paraplegic and amputee rehabilitation.—**Grace Roth**, Rochester, Minn., presented the paper "The Effects of Smoking of Nicotine on the Cardiovascular System of Normal Persons and Patients with Hypertension" at the annual meeting of the American Therapeutic Society in May. This paper was part of the Symposium on Tobacco.—**Howard A. Rusk**, New York City, spoke on "Medicine's Number One Problem" and "The Third Phase of Medical Care" at the annual meeting of the Massachusetts Medical Society.

**Oscar O. Selke, Jr.**, Houston, attended the course in Upper Extremity Prosthesis at the University of California, Los Angeles, last April.—**Wilbur A. Selle**, Los Angeles, attended the discussion of the Cerebral Palsy Institute recently held at Los Angeles.—**Lt. Col. Charles D. Shields**, Fort Sam Houston, Texas, will be transferred from Brooke Army Hospital for duty in the Office of the Surgeon General, Department of the Army. Col. Shields recently attended the meeting of the State of Texas Occupational Therapy Association and discussed the subject "The Use of Occupational Therapy in the Management of Poliomyelitis"; he also was in attendance at the Upper Extremity Prosthesis course conducted at the University of California, Los Angeles.—**Charles Sheard**, Stewartville, Minn., presented the paper "Analysis of Methods of Refraction" at the meeting of the Los Angeles Society of Ophthalmology and Otolaryngology on May 7.—**Euclid M. Smith**, Hot Springs National Park, Ark., has been appointed to the Board of the State Hospital for Nervous Diseases in Arkansas.—**Ivan C. Smith**, Youngstown, Ohio, is serving on the Committee on Medical Care of Veterans of the Ohio State Medical Association.—**George K. Stillwell**, Minneapolis,

participated in a roundtable discussion on rehabilitation for the Duluth Health Council on April 21.—George C. Twombly, Jr., formerly of Denver, is now on active duty with the U. S. Army.—Arthur L. Watkins, Boston, presented the paper "Rheumatoid Arthritis in Industrial Medicine" at the annual convention of the Medical Society of the State of New York in May.

#### RESIDENCIES IN PHYSICAL MEDICINE NOW AVAILABLE

According to the September 27, 1952 issue of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, several residencies in physical medicine are available immediately or through July 1, 1953. Further information regarding the availability of these positions and any additional data regarding the programs can be secured by corresponding directly with the hospitals concerned.

The location and number of residencies available and the person to whom inquiries should be directed are as follows: Army Medical Center, Washington D.C., 4, Surgeon General, Department of Army, Washington 25, D.C.; Veterans Administration Hospital, New York City, 2, Dr. W. W. Schier, Liaison Officer; Veterans Administration Hospital, Aspinwall, Pa., 1, Dean's Committee, University of Pittsburgh School of Medicine; Veterans Administration Hospital, Memphis, Tenn., 2, Dr. J. E. Cottrell, Chief, Professional Services; Veterans Administration Hospital, Houston, Texas, 1, Chairman, Residency Review Board; Veterans Administration Hospital, Wood (Milwaukee), Wis., 1, Dr. W. E. Zeit, Secretary, Dean's Committee, University of Marquette Medical School, Milwaukee, Wis.; Georgia Warm Springs Foundation, Warm Springs, Ga., 1, Dr. Robert L. Bennett; Research and Educational Hospitals, Chicago, 2, Dr. S. W. Olson, Medical Director; University of Kansas Medical Center, Kansas City, Kan., 1, Dr. D. L. Rose; Mayo Foundation, Rochester, Minn., 6, Director, Mayo Foundation; Goldwater Memorial Hospital, New York City, 2, Medical Superintendent of the hospital; Hospital for Joint Diseases, New York City, 1, A. Rosenberg, Executive Director; New York State Rehabilitation Hospital, West Haverstraw, N. Y., 1, Dr. A. J. Canning, Director.

#### CALIFORNIA MEDICAL ASSOCIATION 82nd ANNUAL SESSION

Members of the American Congress of Physical Medicine and Rehabilitation were represented at the 82nd annual session of the California Medical Association, May

24-28, Biltmore Hotel, Los Angeles. Robert Bingham, M.D., of Riverside presented the paper "Surgical Treatment of Low Back Injuries" at the Section on Industrial Medicine and Surgery; Herman Kabat, M.D., of Vallejo, was one of the co-authors of the paper "New Techniques of Physical Therapy for Relaxation of Spasticity," which was scheduled for the Section on Psychiatry and Neurology. Fred B. Moor, M.D., of Los Angeles, opened the discussion of this paper. O. Leonard Huddleston, M.D., of Santa Monica, presented the film "Resistive Exercise Techniques Employed in the Treatment of Respirator Poliomyelitis Patients."

#### WALTER REED SOCIETY ELECTS OFFICERS

Y. T. Oester, M.D., Head of Pharmacology, Stritch Medical School, Loyola University, has been elected one of three vice-presidents of the Walter Reed Society. Frances A. Hellebrandt, M.D., Director, Department of Physical Medicine and Rehabilitation, University of Illinois Research and Educational Hospitals, has been elected Secretary-Treasurer of the organization. The Walter Reed Society is comprised of individuals who have served as voluntary subjects for experimental research.

#### GERONTOLOGICAL SOCIETY TO MEET

The Gerontological Society will hold its annual meeting in San Francisco, August 25-27, 1953. The program will include papers by authorities in the biology of the aging, the medical problems of the higher years and the psychological, social and religious aspects of the aged. Further information regarding this meeting may be had by writing to Dr. Edward L. Bortz, Chairman, Program Committee, 2021 W. Girard Ave., Philadelphia 30, Pa.

#### NEW STANDARDS FOR VOCATIONAL COUNSELORS

The Veterans Administration announced it has raised its hiring standards for vocational counselors, in a move to assure veterans of getting the highest possible calibre of counseling when they apply for training.

Vocational counseling is a "must" for all disabled World War II and Korean veterans planning to take vocational rehabilitation training. It serves the purpose of guiding a man into a field where he stands the best chance of making good in spite of his handicap.

The vocational counseling process consists of thorough interviews and tests which serve to reveal a veteran's aptitudes, interests and

abilities. This gives greater assurance that the occupational goal he chooses is actually suitable for him, and one that he can reach.

#### DENVER CANCER CONFERENCE SCHEDULED

The 7th Annual Rocky Mountain Cancer Conference will be held in Denver on July 8 and 9, 1953. As in previous years, there will be outstanding guest speakers. A banquet and entertainment is planned for the first evening. There is no registration fee for this conference. Complete details may be had by writing Harvey T. Sethman, Executive Secretary, Colorado State Medical Society, 537 Republic Bldg., Denver.

#### LATIN-AMERICAN CONGRESS OF PHYSICAL MEDICINE

The annual dinner of the Latin-American Congress of Physical Medicine was held at the Advertising Club of New York, April 22. Members of the Pan-American Academy of General Practice and the Spanish-American Medical Association of New York were present. Doctors Norman E. Titus, Arturo Martinez, Richard E. Gordon, Madge C. L. McGuinness, and C. L. de Victoria served on the Dinner Committee for the event.

#### ACCEPTED DEVICES

**Teca Low Volt and Pulse Generator, Model CD4P.** — Manufactured by Teca Corporation, 139 E. 23rd St., New York 10, New York. The device is a table model instrument for generating currents to stimulate muscle and nerve. A source of alternating current at 50 to 60 cycles and 110 volts is required; the power consumption is 30 watts. The Council on Physical Medicine and Rehabilitation voted to include the instrument in its apparatus accepted list.

**Continentalair Iceless Oxygen Tent, Model M-4000.** — Manufactured by Continental Hospital Service, 18624 Detroit Ave., Cleveland (Lakewood) 7, Ohio. It is an electrically driven apparatus for administering a cooled stream of oxygen to a patient in bed. It requires a 60 cycle alternating current at 115 volts and draws 7.4 watts. The Council on Physical Medicine and Rehabilitation voted to include the apparatus in its apparatus accepted list.

**Mead Home Treatment Stimulator, Model S-1.** — Manufactured by St. Louis Instrument Engineering, Inc., 1507 S. Compton Ave., St. Louis 4, Mo. The device is a generator of interrupted direct current designed for use by patients who require prolonged treatment of temporarily paralyzed muscles. It requires a source of 60 cycle alternating

current at 115 volts and draws 40 watts. The Council on Physical Medicine and Rehabilitation voted to include the device in its apparatus accepted list.

#### NEWLY ELECTED FELLOWS

At their annual Convocation, Doctors A. Ray Dawson, Richmond, Va.; Earl C. Elkins, Rochester, Minn.; Harry Kessler, Washington, D.C.; Florence I. Mahoney, Memphis, Tenn., and Howard F. Polley, Rochester, Minn., were elected Fellows of the American College of Physicians.

#### NEW PRESIDENT AT UNIVERSITY OF COLORADO

Ward Darley, M.D., has been named to succeed Robert L. Stearns, LL.D., as president of the University of Colorado. Dr. Darley served as medical dean and vice-president of the university since 1949. He is president of the Association of American Medical Colleges and is a member of the medical advisory board of the Rockefeller Foundation.

#### THE KAPPA DELTA AWARD FOR RESEARCH IN ORTHOPAEDIC SURGERY

A prize of \$1,000, donated by the Kappa Delta Sorority, may be awarded annually by the American Academy of Orthopaedic Surgeons for the best research related to orthopaedic surgery and performed by an American citizen in the United States.

The selection will be made from publications after January 1, 1951, or research presented to the Committee on Scientific Investigation of the American Academy of Orthopaedic Surgeons before November 1, 1953.

Researchers interested in competing for the award are requested to secure further information from Dr. John J. Fahey, 1791 W. Howard St., Chicago 26, Ill., Chairman of the Committee on Scientific Investigation of the American Academy of Orthopaedic Surgeons.

#### CANCER GROUP ELECTS PRESIDENT

Dr. Harold P. Rusch, director of the McArdle Memorial Laboratory for cancer research at the University of Wisconsin, has been elected president of the American Association for Cancer Research. The election took place at the annual meeting of the association held recently in Chicago. Dr. Rusch will serve as president of the association until 1954.

### NEW CONGRESS COMMITTEES

Two new Congress Committees have been appointed. They are Committee on Rehabilitation Centers: Arthur Jones, Chairman; George Deaver, and Ralph Worden; and Committee for the Coordination and Integration of Physical Medicine and Rehabilitation in Geriatrics: Michael Dacso, Chairman; Nila Kirkpatrick Covalt; Harold Dinken; Karl Harpuder, and George M. Piersol.

### PROGRAM IN CEREBRAL PALSY TO BE CONDUCTED

A Cerebral Palsy Program will be conducted at Michigan State College, Ypsilanti, Mich., June 17 - July 24, in cooperation with the National Society for Crippled Children and Adults and the Michigan Society for Crippled Children and Adults.

A bulletin supplying complete information on these courses can be obtained by writing to F. E. Lord, Director of Special Education, Michigan State Normal College, Ypsilanti, Mich.

### INTERAMERICAN FOUNDATION FOR POSTGRADUATE MEDICAL EDUCATION

The Interamerican Foundation for Postgraduate Medical Education has been organized for the purpose of encouraging exchanges of educators, postgraduate students and research workers in the field of medicine and allied sciences in Latin and North American countries. Substantial financial support has been obtained and more is now being solicited from commercial firms in North America interested in the furtherance of friendly relations between the Americas. In the past a number of such companies have independently supported fellowship programs for Latin Americans who sought postgraduate training in the United States. The new foundation is designed to coordinate and extend these opportunities through a central agency which will in turn coordinate its program with that of other groups, private foundations and governmental agencies, with parallel or overlapping interests in this field. Committees of medical educators in each Latin American country will be asked to assume responsibility for nominating candidates for fellowships. The proposed program also provides for interchanges of a limited number of visiting lecturers, with expenses defrayed through the foundation. The Executive Director of the Foundation is Alberto Chattas, M.D., of Cordoba, Argentina, with present headquarters at 112 E. Chestnut St., Chicago 11, Ill.

### UNIVERSITY OF MICHIGAN SIXTH ANNUAL CONFERENCE ON AGING

"Careers for Maturing Workers" is the theme of the University of Michigan Sixth Annual Conference on Aging to be held in Ann Arbor, July 8 - 10, 1953. The problems associated with earning in the later years and with methods for creating new opportunities for remunerative activity by aging people are particularly pressing at this time because of the steadily increasing number of older workers cut off from earning opportunities.

Discussion sections led by nationally known experts will consider: Economic, social and personal values of continuing employment; the maturing worker from the standpoint of health; age, skill and motivation as factors in adjustment of the older worker; counseling, guidance, placement and training of the maturing worker; continuing employment in business and industry; practical considerations in specific fields of work including arts, crafts, manufacturing and service occupations; development of new opportunities in all fields of work, and needed action by business, industry, unions, communities and government agencies.

Conference membership is open to anyone. Exhibits and demonstrations of marketable skills will be a feature of the conference. For further information about the program, write to Wilma Donahue, Chairman, Division of Gerontology, University of Michigan, 1510 Rackham Bldg., Ann Arbor, Mich.

### HAND TALKING CHART AVAILABLE

A new system or method by which stroke victims affected by "complete" aphasia, also daily accident victims and hospitalized aphasic veterans, can communicate with those around them, thus making their wishes and basic needs known by hand-signs, using only one hand, that are simple and easily demonstrated, was devised by Dr. Hamilton Cameron. For gratis copies of the chart, write Dr. Hamilton Cameron, 601 W. 110th St., New York 25, N.Y.

### NEW DEAN AT ROCHESTER SCHOOL OF MEDICINE

Donald G. Anderson, M.D., Secretary of the Council on Medical Education and Hospitals of the American Medical Association and Secretary-Treasurer of the American Medical Education Foundation, has been appointed dean of the University of Rochester School of Medicine and Dentistry.

### A RIDDLE WHAT CAN YOU GIVE AWAY, BUT STILL HAVE?

The answer is **BLOOD**! You can donate a pint to the National Blood Program but still have all your blood . . . because your body makes more to take its place. It's just that simple.

As an average healthy person, you have 12 to 13 pints of blood. Your blood is constantly being replenished. The removal of a pint calls for no special effort on the body's part. The liquid part is replaced almost immediately, the cells and minerals after a few days. Donating a pint of blood is comparable to an afternoon's exercise. A person in good health can do either safely.

So, you can give . . . again and again . . . actually to gain back every drop. When you donate a pint of blood, the only feeling you have is one of satisfaction in helping someone live. A few minutes of your time may mean a lifetime to someone else.

To meet the nation's need for whole blood and derivatives, the National Blood Program must receive the voluntary donation of over 5,000,000 pints this year. To Federal Civil Defense for building reserves of serum albumin, to accident victims in need of whole blood transfusions, to wounded service men in need of shock units of serum albumin, and to children exposed to polio in need of the blood derivative, Gamma Globulin, **YOUR BLOOD IS VITAL.**

Your donation means so much and costs you absolutely nothing. Your blood spells life and health to so many without your really losing a thing. Call your local Red Cross, Community or Armed Forces Blood Donor Center **TODAY** and schedule **YOUR** donation of blood.

### NEWLY REGISTERED PHYSICAL THERAPISTS

April 23, 1953

Booth, Rose E. Kubiak, 1606 First Ave., New York 28, N. Y.

Cash, Lorraine Dorothea, 2151 W. 56th Ave., Denver, Colo.

Cobb, Evelyn Joyce, Spring St., Cheshire, Mass.

Shelly, Philip Edward, 161 S. Burlington Ave., Los Angeles 4, Calif.

Velez, Dolly, Calle 62, No. 52-78, Medellin, Columbia, S. A.

April 28, 1953

Woods, William Lee, 528 W. Martin St., Martinsburg, W. Va.

### U. S. PUBLIC HEALTH SERVICE ANNOUNCES TWO NEW APPOINTMENTS

Two important appointments to the U. S. Public Health Service have been announced by the Surgeon General, Dr. Leonard A. Scheele. They include Dr. David E. Price as assistant surgeon general and Dr. C. J. Van Slyke as an associate director of the National Institutes of Health. Dr. Price will assist the surgeon general in the administration of the Public Health service. Dr. Van Slyke will now be responsible for coordinating programs of research and training grants, disease control and community services, professional training and relationships with national foundations for the National Institutes of Health.

### AFFILIATION ESTABLISHED FOR TEACHING PURPOSES

The New York Medical College and Flower and Fifth Avenue Hospital in New York City, and the Kessler Institute for Rehabilitation in West Orange, New Jersey, have reached an affiliation for teaching purposes, it was announced by the governing boards of the two institutions. Jerome Tobis, M.D., director of the department of physical medicine and rehabilitation at the New York Medical College, is a member of the consulting medical staff of the Kessler Institute for Rehabilitation. Henry H. Kessler, M.D., medical director of the institute, is a clinical professor of rehabilitation at the New York Medical College.

**THE PRELIMINARY PROGRAM OF THE  
31st ANNUAL SESSION WILL BE PUBLISHED  
IN THE JULY ISSUE OF THE *ARCHIVES***

## BOOK REVIEWS

*The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Society of Physical Medicine and Rehabilitation.*

**STORIES AND GAMES FOR EASY LIP-READING PRACTICE.** By *Rose V. Feilbach*. Paper. Price, \$2.50. Pp. 108. The Volta Bureau, 1537 35th Street, N.W., Washington 7, D.C.

This book offers a collection of questions, stories, and games that can be used by a teacher leading a class in lipreading. It should be welcomed as providing a wealth of interesting and varied material that will save hours of searching on the part of the teacher.

Its usefulness in a given situation depends on the skill of the teacher and the level of achievement of the pupils, who are assumed to be able to read and write and to have a considerable store of information about history, geography, and current events. This is noted in the preface. Some of the assignments could be made easier by expanding the sentences so as to give the listener leads, especially when proper names are involved; thus "he lived in a city called Atlanta" is preferable to "he lived in Atlanta," and the question "In which country would you be if you were watching a picador?" is easier to answer than simply "Where would you be if you were watching a picador?" This suggests the possibility of further collections of this sort, graduated as to difficulty, and perhaps with increasing emphasis on "speech reading" as distinguished from "lipreading." It is hoped that the author will feel encouraged to persevere in this good work.

**A TEXTBOOK OF PATHOLOGY.** By *E. T. Bell*, M.D., Emeritus Professor of Pathology in the University of Minnesota, Minneapolis, Minn. Contributors: *B. J. Clawson*, M.D., Emeritus Professor of Pathology in the University of Minnesota and *J. S. McCartney*, M.D., Professor of Pathology in the University of Minnesota. Seventh edition. Cloth. Price, \$12.00. Pp. 1008 with illustrations. Lea & Febiger, Washington Square, Philadelphia 6, 1952.

The text is concise, well balanced and the format and composition of the book excellent. The total length of 1008 pages, including in-

dex, necessitates brief discussion and descriptions in most instances but, in general, the presentation is highly satisfactory. References are conveniently arranged and include some as recent as 1950. Illustrations are excellent, both as to selection and quality of reproduction. As a textbook with the task of presenting a broad field of pathology, this volume serves its purpose well for general reading, as well as for reference.

**THE METABOLIC RESPONSE TO SURGERY.** By *Francis D. Moore*, M.D., Moseley Professor of Surgery, Harvard Medical School, Surgeon-in-Chief, Peter Bent Brigham Hospital, Boston, Massachusetts and *Margaret R. Ball*, A.B., Department of Surgery, Harvard Medical School, Laboratory for Surgical Research, Peter Bent Brigham Hospital, Boston, Massachusetts. Fabrikoid. Price, \$7.50. Pp. 156. Metabolic Diagrams by *Mildred B. Codding*, A.B., M.A., Surgical Artist, Department of Surgery, Harvard Medical School, Peter Bent Brigham Hospital, Boston, Mass. Charles C Thomas, 301-327 E. Lawrence Ave., Springfield, Ill., 1952.

"The Metabolic Response to Surgery," a monograph by Francis Moore and his associates, is an outstanding contribution to the study of "biological response to surgery." The text presents not only the factual and statistical observations of pre- and post-operative changes in balance of nitrogen, potassium, sodium, caloric consumption, eosinophil and 17 Ketosteroids, but also offers well grounded analysis of the data presented. An excellent visual aid is utilized in the unique mode of charting the multiple day by day determinations. Balance, negative or positive, is impressively obvious. The mode of charting is not practical for adoption on most surgical services, and demonstrates the need for special workers in this field, perhaps in each major surgical unit with adequate laboratory facilities. The divisions of the monograph dealing with different degrees of surgical trauma emphasize the need for specificity in study of problems of metabolic balance. Starvation, pre-operative depletion, repeated surgical

trauma and other examples of different types of problems are studied individually and explanations of similarities and differences are offered.

The text is necessarily complex and not designed for the surgical dilettante who prefers axiomatic rules of thumb. However, a final chapter entitled "Facts and Corollaries," provides a summary of observations and beliefs of the authors in a terse, direct form. This synopsis alone makes the monograph of value to even the casual student of pre- and post-operative care!

**BASIC BIOLOGY OF MAN.** By G. Kas-  
*ten Tallmadge*, Professor of the History of  
Medicine, Assistant Professor of Anatomy,  
Marquette University, Associate, Medical Staff  
of Columbia Hospital, Milwaukee, Wisconsin.  
Cloth. Price, \$3.00. Pp. 244 with illustrations.  
Random House, Inc., 457 Madison  
Avenue, New York 22, 1952.

This is one of a series of informative scientific texts for lay people. Its scope is the anatomy and physiology of man and some of the clinical relevance thereof plus smatterings of surgery, pathology and the history of science. The arrangement is good; the text is necessarily abbreviated—occasionally discursive—and unfortunately, unrelieved by any touch of humor or humanity. Although (p. 210) the efferent arteriole is not a venous vessel, the information is substantially accurate. The book can be recommended to those inquiring laymen who have the patience and compulsiveness to eat dry cereal.

**THE AMERICAN ACADEMY OF  
ORTHOPAEDIC SURGEONS: INSTRU-  
CTIONAL COURSE LECTURES.** Volume  
IX. Editor: *Charles N. Pease*, M.D. Cloth.  
Price, \$10.75. Pp. 450, with illustrations.  
J. W. Edwards, 1745 S. State St., Ann Ar-  
bor, Mich., 1952.

This is the ninth edition of these lecture courses. Twenty six chapters are included in this edition. All are important and the majority are as valuable to the physiatrist as the orthopedists.

Each chapter could be cited, but the following are singled out to show the contents of the book. Cerebral palsy is considered in four lectures. Dr. R. Plato Schwartz is the first in this series. He opens with the following: "The child with cerebral palsy needs to be habilitated, not rehabilitated," and wisely expands his ideas. The last chapter is written by Dr. A. Steindler on Pathokinesics of Cerebral Palsy, in which he explains the locomotor disorders of spastic paralysis from the kinetic point of view, that is from the point of disturbance of muscle function, of muscle equilibrium, and the effect it has on the function of the joint. As is to be expected from Dr. Steindler, this presentation

is new, scholarly and stimulating.

The chapter on chronic poliomyelitis by Dr. William Green of Boston brings out many features that need constant repetition. He gives good advice on early ambulation for paralyzed lower extremities, particularly the difference between children and adults, the use of braces for support and correction, and recognition of the value of functional training. His discussion of the latest surgical procedures for the physical defects is very well done. The following statements are his closing remarks. "The orthopedic surgeon's fundamental training in neuromuscular and skeletal function should enable him to perceive the total picture in greater clarity than any other individual concerned with the patient's care. He should be the coordinator in the total program of physical rehabilitation, education, vocational training, and finally, the attainment of social and economic independence." Dr. Green must be the only orthopedist who has never heard of physiatrists and their functions.

A section entitled "The Anatomy of Joints" by Dr. Ernest Gardner consists of three lectures — the first is on the development of joints dealing with basic changes during the embryonic and fetal periods; the second on the nerve supply, with particular emphasis on their functions and their relation to joint pain; and the last on synovial tissue and synovial fluid, setting forth the latest concept of the physiology of these structures. Five lectures on braces are included. The various principles for the use of braces are given, such as for immobilization, contractures and for support. Many types of braces are described and illustrated. This should be a most practical section. A very interesting section of four short articles, three by Dr. Charles Bechtol of Oakland, Calif., discuss the engineering principles of bones and joints. The mechanical factors that cause fractures and the methods that are employed in their reduction and fixation are considered from the mechanical aspects. Dr. de Takats has an excellent review discussion on thromboembolism. A practical chapter on disability evaluation is presented by Dr. Schneider of Milwaukee. The compensable situation for different parts of the body is illustrated by case reports. The last chapter entitled "History and Biography of Orthopedic Surgery" briefly relates various contributions by surgeons and physicians from the time of Hippocrates. Many subjects are presented such as intervertebral disk, growth examination, club feet, myasthenia gravis, benign lesions simulating malignancy, and others. By reading these volumes each year, a most up to date and valuable post graduate course is furnished. The book is highly recommended to physiatrists and personnel in physical medicine.

**THE MANAGEMENT OF BRONCHIAL ASTHMA: A GUIDE TO TREATMENT.** By *Herbert G. J. Herzheimer, M.D., L.R.C.P.Ed., L.R.C.S.Ed.*, Research Assistant, University College Hospital Medical School, London. Cloth. Price, \$3.45. Pp. 107, with 16 illustrations. Butterworth & Co., Ltd., 4-6 Bell Yard, Temple Bar, London, W.C.2, 1952.

This text of some eleven chapters attempts to cover primarily the more recent advances in the treatment of asthma and in particular to emphasize the need for individuality of treatment as the circumstances in a particular case may require. Chapters are devoted to diagnosis, classification of the disease, methods and techniques of treatment, including the use of ACTH and cortisone as well as the psychological approach. Although little is presented that is new concerning either the diagnosis or treatment of the disease the author is to be commended on the composite collection and presentation of the material. It is a text of interest to all physicians who see or are interested in bronchial asthma.

**THE HAIR AND SCALP.** A Clinical Study (With a Chapter on Hirsuties). By *Agnes Savill, M.A., M.D.(Glasg.)*, F.R.C.P.I., Consulting Physician to Fitzroy Square Skin Hospital; Formerly Honorary Dermatologist to the Royal Surrey County Hospital, Guildford, Surrey; Physician to St. John's Hospital for Skin Diseases, Leicester Square; to the skin department, South London Hospital for Women; and Chief (During the 1914-18 War) of the Electrotherapeutic Department, Scottish Women's Hospital, Royaumont, France. Fourth edition. Cloth. Price, \$5.50. Pp. 316 with illustrations. William Wood & Company (division of Williams & Wilkins Co.) Mount Royal and Guilford Aves., Baltimore 2, 1952.

In this volume of 316 pages the author presents the subject matter primarily from the woman's point of view, deviating from the usual textbook modality by a smooth narrative and inductive style. The first chapters are devoted to anatomy and physiology, physical properties and medico-legal aspects; a chapter deals with gray hair and alterations in color. In two chapters the care of the hair, and the molecular structure and elasticity of hair relative to permanent waving are discussed in detail. In two chapters certain common disorders and diffuse hair fall without apparent disease of the scalp are reviewed. Subsequent chapters are concerned with diseases of the hair and scalp from both systemic and local causes. The various sections of these chapters are introduced by a short statement of abnormal findings of the hair and scalp in a patient and an enlarge-

ment on the theme by a discussion on procedures in examination, etiologic investigation, prognosis and treatment of both local and systemic causes. Many short case reports are used as illustrations. Histopathological descriptions are omitted. A chapter is devoted to hair dyes and their uses, abuses, and medico-legal aspects. There is a detailed chapter on hirsuties which, along with hair fall, is of the utmost concern to women. A short therapeutic formula section and an index conclude the book. This volume is recommended for students and general practitioners as a convenient desk reference. The plain, simple and direct style makes the subject matter useful to nurses, licensed technical cosmetologists and beauty shop operators.

**TEXTBOOK OF MEDICINE.** Edited by *Sir John Conybeare, K.B.E., M.C., D.M.* (Oxon.), F.R.C.P., Physician to Guy's Hospital, London and *W. N. Mann, M.D.* (Lond.), F.R.C.P., Assistant Physician to Guy's Hospital, London. Tenth edition. Cloth. Price, \$8.00. Pp. 912, with illustrations. Williams & Wilkins Co., Mt. Royal and Guilford Aves., Baltimore 2, 1952.

The tenth edition of this established text book of medicine is ample evidence of its value. It fulfills the avowed purpose of the senior editor to provide the essentials of medicine as concisely and cheaply as possible. Many sections have been completely rewritten and new sections on congenital heart disease and anti-coagulant drugs are included. A remarkably up-to-date appendix on the sulfonamides and antibiotic drugs is added. Apparently the aplastic anemia occasionally observed with chloramphenicol was unrecognized prior to publication. The sections on cardiovascular, renal and gastrointestinal diseases are well organized and presented. The discussion of renal function is an excellent introduction to the section on renal disease. The editors have generally succeeded in devoting more pages to common disorders and less to rare diseases. The reviewer observes, however, that 162 pages are devoted to neurological diseases and only 9 lines to multiple myelomatosis. There are certain omissions and inaccuracies which seem worthy of comment. For example, secondary amyloidosis is described, but primary amyloidosis is not mentioned. The statement that "Coolidge's anemia is thought to be genetic in origin" is ultra-cautious because the evidence of the genetic origin is overwhelming. In regards to the treatment of adrenal cortical insufficiency (Addison's disease), no mention is made of the use of cortisone. It seems unfortunate that a modern text book which in one section laudably denies that splenic anemia (Banti's disease) is a clinical or pathologic entity continues to use the archaic terminology of acholuric jaundice and congenital hemolytic

jaundice to denote hereditary spherocytosis. These are, of course, minor points but it appears unforgivable to an American reviewer to find no mention of the importance of cessation of tobacco in the treatment of thrombo-angiitis obliterans. Medical students will find this text book to be on a par with the standard American text books of medicine. A novel feature is a table of the physiological normal values of laboratory determinations on the inside of the front cover.

**NORMAL BLOOD PRESSURE AND HYPERTENSION: NEW DEFINITIONS.** By *Arthur M. Master, M.D.*, Cardiologist, Mount Sinai Hospital, New York, *Charles I. Garfield, M.D.*, Research Assistant in Cardiology, Mount Sinai Hospital, and *Max B. Walters, M.D., F.R.C.P.* Cloth. Price, \$4.00. Pp. 144, with 36 illustrations. Lea & Febiger, 600 S. Washington Sq., Philadelphia 6, 1952.

The authors have set out to define and document the standards of what is normal in blood pressure. Their approach is clinical rather than statistical. They point out that present standards of normal blood pressure have no individual relevance and believe that tension to be normal which is consistent with a normal capacity for life and the enjoyment thereof. They propose, as a result of their experience, a range which is higher than that commonly accepted and which varies with age and sex. Thus, at the ages 20 to 25, the upper limit of normal systolic pressure in men is 140 mm. Hg and in women 130, while the respective lower limits of hypertension are respectively 150 and 130. This revision of the elusive "normal" has important implications in clinical, military and industrial practice. It requires further documentation to establish it beyond all doubt but, in the meantime, it can advantageously be used to relieve many a sphymomanometric neurosis. The first part of the book is an excellent history of sphymomanometry. The book is recommended to all who have occasion to measure and evaluate blood pressure. It deserves a very wide distribution. With this in mind, the publishers seem to have underestimated the value of the book while overestimating its cost.

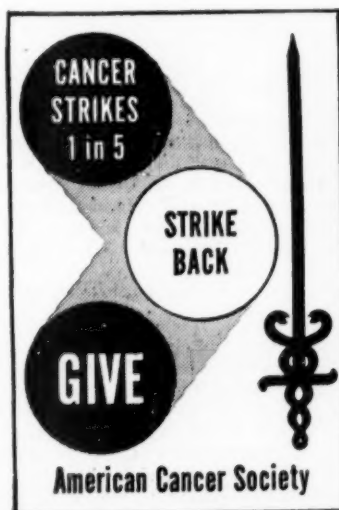
**DIAGNOSTIC AND EXPERIMENTAL METHODS IN TUBERCULOSIS.** By *Henry Stuart Willis, M.A., M.D., F.A.C.P.*, Superintendent and Medical Director, North Carolina Sanatoria, McCain, North Carolina, and *Martin Marc Cummings, M.D., F.C.C.P.*, Director, Tuberculosis Research Laboratory, Lawson Veterans Administration Hospital, Chamblee, Georgia. Second edition. Cloth. Price, \$10.00. Pp. 373, with 40 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell

Scientific Publications, Ltd., 49 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, 1952.

The text represents and fulfills most adequately the intended purpose, namely, to make available a worthwhile reliable source of information of the essential features of the laboratory approach to tuberculosis. The book provides historic background as well as minimal basic knowledge for tests and methods used in the laboratory diagnosis of the disease. Included in the presentation are sections on the secretions, excretions, and fluids of the tuberculous body; a section on the tubercle bacillus and ways of its detection and cultivation; one on related clinical and laboratory methods which includes the use of tuberculin, BCG vaccine and chemotherapy; and finally several chapters on experimental methods. The publishing is excellent. The text is recommended for use by all interested students.

**ORTHODONTICS: DIAGNOSIS, PROGNOSIS, TREATMENT.** By *Bercu Fischer, D.D.S.* Cloth. Price, \$12.00. Pp. 334, with 1180 illustrations. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; 7 Grape St., Shaftesbury Ave., London, W.C.2, 1952.

This is not a text book for the student orthodontist but an excellent presentation of a new approach to the treatment of malocclusion, especially to what is known as class II cases.



## PHYSICAL MEDICINE ABSTRACTS

### **Peripheral and Visceral Vascular Effects of Exercise and Postprandial State in Supine Position. Milton Lowenthal; Karl Harpuder, and Stanley D. Blatt.**

*J. Applied Physiol.* 4:689 (Feb.) 1952.

The changes in peripheral and visceral blood flow of normal man during activities of daily life have not been studied systematically. These activities involve a number of factors which impose strain upon the cardiovascular system. The total circulatory effect of exercise is a composite of the effects of muscle contractions, postural changes, emotional stimuli, respiratory influences, changes of environmental temperature and postprandial vascular alterations. In this investigation, single circulatory factors of physiologic importance and the results of their combination were studied. Peripheral and visceral blood flow was measured on normal man in the horizontal position at rest, after exercise, after a meal and after a meal and exercise. Measurements were taken on hand and fingers, forearm, kidney and liver. Exercise was carried out by weight lifting with the lower extremities. Exercise alone or following a protein meal did not produce significant changes in the circulation of inactive muscle groups of the kidney and liver. It did increase skin flow. A heavy protein meal caused increased blood flow in the liver.

### **Absence of Clinical Evidence of Destructive Lesions of the Sympathetic Nervous System in Acute Anterior Poliomyelitis. Lewis J. Pollock; Norman B. Dobin; Benjamin Boshes; Alex J. Arieff; Herman Chor; I. Finkelman; Meyer Brown; Irving C. Sherman; Erich Liebert, and Eli L. Tigay.**

*Arch. Neurol. & Psychiat.* 67:725. (June) 1952.

There is need for clarification of the reports upon disturbances in functions of the sympathetic nervous system in acute anterior poliomyelitis. Often coupled with reference to the work of others, and with reports of the authors themselves upon pathologic changes in the intermediolateral column of cells and in the ganglia of the sympathetic

chain, a description is given of some change in function of the sympathetic nervous system, leading to the assumption that the dysfunction noted is related to the pathologic changes described. For the most part, evidence of such dysfunction has consisted of some one sign or symptom, such as excessive sweating, increased electrical skin resistance in the axillae, or temporary retention of urine during the acute stage.

Ninety-one patients suffering from acute anterior poliomyelitis during the fall of 1950 were examined at the Chicago Municipal Contagious Disease Hospital. The studies conducted on these patients consisted of measurement of the skin temperature, electrical skin resistance, and sweating; determination of the relative humidity of the skin by a hygrometer; oscillometry; and cold-pressor tests. In the study of skin temperatures, a significant increase in skin temperature, differences between paralyzed and unparalyzed extremities, and a skin-temperature gradient were sought. In the study of amplitude of vascular oscillations, the ratio of the amplitude of the oscillations in the leg and that of oscillations in the forearm was estimated; similarly, the ratio for paralyzed and unparalyzed extremities was determined. In respect to electrical skin resistance and sweating, the measurements on the paralyzed side were compared with those on the unparalyzed side. Finally, when any one of these methods served to indicate a dysfunction, effort was made to determine whether such a conclusion could be confirmed by the other methods of examination.

In summary, it may be said that a single indication of possible dysfunction occurred in significant numbers and was more frequently found in unparalyzed extremities. A combination of two indications was found in too few cases, and with only slightly greater frequency in paralyzed extremities, to be significant. In very few cases a combination of three indications was found about equally in paralyzed and in unparalyzed extremities. In no case was there found a combination of all four indications of possible dysfunction of the sympathetic nervous system.

**Prophylaxis of Scoliosis. Alvin M. Arkin.**

J. Bone & Joint Surg. 34-A:47 (Jan.) 1952.

Arkin states that if all functional curves were recognized and corrected, most structural curves could be prevented. The problem has been to recognize and correct the functional curves. These are commonly overlooked, especially when mild, or neglected when recognized. Even when they are actively treated, the usual methods of postural exercises and braces often are unsuccessful, partly because of the patient's lack of cooperation, partly because of defects inherent in the method. Postural exercises, though useful, are effective only at the actual moment when they are being done; the gravitational pressure is symmetrical only when the spine is actually straight. Fifteen minutes of daily physical therapy are easily outweighed by fifteen hours of slumping. Braces, if effective, are conspicuous and often uncomfortable because of pressure on the rib cage; they usually meet with marked resistance on the part of the patient. On the other hand, shoe and buttock corrections are comfortable, inconspicuous, and readily accepted by the patient. Lateral recumbency is not particularly difficult to enforce if it is the position used for homework and television hours; perhaps it may not be essential if the curve is well corrected by the pelvic tilt. It is hoped that the ease and simplicity of this method will stimulate early recognition and adequate treatment of functional curvatures.

**The Benefit of Respiratory Exercises in the Emphysematous Patient. Warde B. Allan.**

Am. J. M. Sc. 224:320 (Sept.) 1952.

In summarizing briefly the mechanics and physiology of emphysema, it is apparent that the lung volume is greatly increased, the residual air greatly increased, the ventilatory exchange greatly reduced, and the vital capacity usually reduced. The maximum breathing capacity is always considerably below the estimated normal. As the early stages of emphysema are not recognizable, it is almost impossible to prevent or to retard its gradual and sometimes rapid development, and in the treatment of the established state most measures have been without effect.

After observing many cases of emphysema, Allan felt that exercises might be employed, stressing upper abdominal and lower thoracic breathing thus bringing the diaphragm into a more active role during respiration. In the past three and a half years he has taught special respiratory exercises to more than 235 patients who have emphysema. Most of these patients have had an associated bronchitis, and most of them were in the older age group. The results have been very good.

It is of paramount importance to impress upon the patient being taught such exercises that his breathing mechanism can be helped. It is then demonstrated to the patient that instead of struggling to make the thorax move, it is much better and simpler to use the abdominal muscles. Then it is shown that the expiratory phase of respiration is the important feature, and instead of being passive he is able to make it active, with the result that the inspiratory phase becomes passive rather than active. These patients can rapidly accommodate their respirations to conform with this newer concept.

It is explained to the patient that this treatment is useful in chronic chest diseases in which there has developed constant out-flow obstruction. This also applies to asthma of long duration, which has resulted in obstructive emphysema more severe than the paroxysmal episodes of asthma. The purpose of the treatment is to reeducate the respiratory pattern to an involuntary continuous function in which emphasis is placed on expiration as the active phase and inspiration as the passive phase. It is emphasized that there is no set of exercises which can be mimeographed and handed to patients to be done at home. The importance of individual differences and the day to day developments cannot be overemphasized nor can they be anticipated. Therefore, each patient is a different problem and the specific prescriptions are made every day according to progress made and stumbling blocks which develop.

A series of exercises devised for Allan by a qualified physical therapist are included in this article. They have been found to be a very useful adjunct in the treatment of emphysema.

**Early Treatment of Injuries to Flexor and Extensor Tendons of the Hand. Herbert v.H. Thatcher.**

Northwest Med. 51:867 (Oct.) 1952.

The most important single obstacle to healing and function following hand injuries is infection. To prevent this, primary treatment must be carried out as soon as possible after injury, preferably within four hours. To be adequately treated, the patient must be cared for in a hospital and not in the physician's office. Repair of the injury is best done under a general anesthetic and under the same sterile conditions employed for any other surgical procedure.

To prevent formation of adhesions and insure adequate function of the joints as well as adequate function of the tendons in their sheaths, daily finger exercises are started as soon as the initial dressing has been removed. These are at first passive, then gradually more active and they vary somewhat in accordance with the tendons that have been repaired. Thus, when flexor tendons alone have been

repaired, the patient is asked to flex the fingers a little each day and extend them just to the limit of the semiflexion position maintained by the bandage so that there will be no undue strain on the suture line. At the end of about three weeks there usually is enough physiologic union of the tendons to permit more active daily flexion and extension. The patient is then encouraged to increase his finger exercises until the maximum amount of motion has been obtained.

When only extensor tendons have been repaired, the patient is asked to flex and extend the fingers a few times as soon as his dressing and splints have been removed. Then the splints are applied again. It is well known that one cannot leave a splint on a finger continuously for from three to six weeks and achieve a good joint motion, even if the tendons have been sutured. By the third or fourth postoperative visit the patient can be taught how to reapply the splints himself after he has carried out his daily flexion and extension exercises. He must, however, be impressed with the importance of (1) wearing the splints as long as there is any droop of the extensor mechanism and (2) carrying out daily finger exercises during this time. By the end of four weeks splints are usually necessary only at night.

When both the flexor and extensor tendons have been repaired in the same finger, the exercises are the same as they would be if only the flexor tendon had been repaired. In the fingers, flexion is more important than extension. Therefore, every effort must be made to restore the flexion mechanism, even at the cost of impairing extensor tendon function. Extensor tendons can be repaired more easily than flexor tendons at secondary operation.

#### Clinical Effect of Ultrasonic Waves in Chondromalacic and Osteoarthritic Changes in the Knee. Olov Lindahl.

Rheumatism 8:36 (April) 1952.

In order to obtain a more objective assessment of the value of ultrasonic energy, a series of patients with pain in the knee-joints have for a little more than a year been treated with ultrasonic waves in the orthopedic department of St. Gorans Hospital in Stockholm. During this period the patients received no other therapy. In most cases the pain was of many years' standing and the earlier treatment of short-wave, x-ray and physical therapy had had only transient or no effect. Painful conditions of specific nature, which were due to tumors or to tuberculous or other infections, were not included. The complaints were of common type, with pain in the knees aggravated on exertion and walking, in many cases most noticeable on walking up or down a flight of stairs.

The patients were examined before the treatment was started, and subjective and objective symptoms were recorded, in all cases by the same examiner. The patients were then given a total of ten treatments, three each week. The moving technique was used in applying the ultrasonic vibrations, and the period of application was successively increased from 8 to 12 minutes. About a week after the termination of treatment the patients were re-examined and subjective and objective symptoms were again recorded. A similar re-examination was done after another month. About half the number of the treated patients were given so-called O-treatment, that is, the control lamp was alight but the effect was adjusted to minimum strength and the crystal was not tuned in. These cases were chosen at random in the therapy department and the examiner did not know the nature of the treatment. Otherwise the usual procedure was employed, and it was not possible for the patients to check the adjustment of the apparatus. Up to the present 40 patients have been treated and the material has been analyzed. The results obtained thus far show that no essential changes in the objective symptoms occurred during the period of treatment, nor was any significant difference in the objective and subjective symptoms demonstrated at the re-examinations. With regard to the subjective symptoms, 17 had marked improvement, 10 improvement, 6 slight improvement, and 7 no change. Thus in this experiment, with the dosage used, the application of ultrasonic energy had no significant therapeutic effect on the pain in cases of malacic and osteoarthritic changes of the knee-joints. The percentage of improvement and no change quoted here may therefore be said to represent the power of spontaneous remission of the symptoms.

Ultrasonic energy also was used on ten patients with painful conditions of neuralgic and rheumatic character, for example, sciatica and brachialgia. The patients selected for this experiment had long-standing persistent pain and had received all the usual forms of treatment without any effect. Application of ultrasonic vibrations had a beneficial effect on all these cases. This conclusion is based on relatively small material and cannot be considered to be significant; nevertheless, Lindahl believes that, although its value in cases of pain in the knee is uncertain, treatment with ultrasonic energy may have a lasting effect in painful conditions of neuritic and neuralgic character.

#### Treatment of Flatfoot in Children. J. H. Kite. M. Ann. District of Columbia 21:316 (June) 1952.

Flatfoot deformity in children is due to a muscle imbalance. The muscles on the lateral

side of the foot work at an advantage and pull the foot into a flatfoot position. Mild cases may be treated by swung-in shoes alone. The more severe flatfeet need manual stretchings in addition to swung-in shoes. Older children are taught exercises, as follows: The patient in sitting position is taught how to turn the foot down and in and up, pulling it up with the anterior tibial muscle, and holding it for the count of ten. This is repeated a given number of times. In standing position, he is taught to stand pigeon-toed and to come up on the tiptoes and hold it for an instant and return. This is done a given number of times. Still standing pigeon-

toed, the patient is next taught to come up on the lateral border of the feet and to hold it for an instant, doing this the same number of times. If the heel cords are short, a fourth exercise is taught. The patient stands near a wall and leans forward and touches his chest to the wall. He must stand pigeon-toed and must keep his heels tight on the floor. More stretch can be put on the Achilles tendon by standing a little farther from the wall. Arch supports are used only occasionally for the more severely deformed feet. Satisfactory results may be expected if the treatment is begun early and followed persistently.

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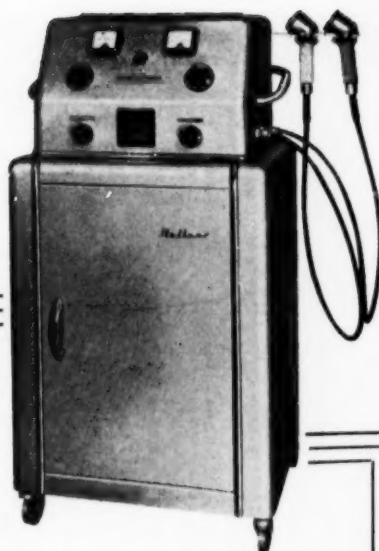


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# APPROVED SCHOOLS OF PHYSICAL THERAPY \*\*

Council on Medical Education and Hospitals  
of the American Medical Association

| Name and Location of School<br>U. S. Army Medical Service  | Medical Director<br>and<br>Technical Director  | Entrance<br>Requirements | Duration<br>of<br>Course | Classes<br>Begin | Max-<br>imum<br>Enrol-<br>ment | Tuition                           | Certificate,<br>Diploma,<br>Degree |
|--|--|--------------------------|--------------------------|------------------|--------------------------------|-----------------------------------|------------------------------------|
| (Address all inquiries to the Office of the Surgeon General,<br>Department of the Army, Washington 25, D.C.)<br>Medical Field Service School, Brooke Army Medical Center,<br>Fort Sam Houston, Texas, and Brooke, Walter Reed and<br>Letterman Army Hospitals. | Charles D. Shields, Lt. Col., M.C.,<br>and Vann S. Taylor, Major, M.C.<br>Agnes P. Snyder, Major, W.M.S.C. | c                        | 49 wks.                  | Mar.-Sept.       | 26                             | None                              | Certificate                        |
| Childrens Hospital, Los Angeles*   | S. S. Matthews, M.D.   | a-b-d                    | 14 mos.                  | Sept             | 14                             | \$300                             | Cert. or Degree                    |
| College of Medical Evangelists, Los Angeles*   | Mrs. Mary J. Dodge   | a-b-c                    | 15 mos.                  | Sept             | 16                             | \$300                             | Cert. or Degree                    |
| University of Southern California, Los Angeles*  | F. B. Moor, M.D.   | a-b-d                    | 14 mos.                  | Sept             | 16                             | Univer.                           | Certificate                        |
| University of California School of Medicine, San Francisco*  | C. Wm. Berdan  | d                        | 4 yrs.                   | Feb/Sept         | 16                             | \$2250                            | Cert. & Degree                     |
| Stanford University, Stanford University, Calif.*  | Charlotte W. Anderson  | a-b-d                    | 12 mos.                  | Sept             | 29                             | \$600                             | Certificate                        |
| University of Colorado Medical Center, Denver*   | Lucile Eising, M.D.  | a-d-e                    | 12 mos.                  | Varies           | 16                             | \$220 gr.                         | Cert. or Degree                    |
| University of Connecticut, Storrs*   | Margery L. Wagner  | c-f                      | 2-4 yrs.                 | Feb/Sept         | 12                             | \$1500                            | Degree                             |
| Northeastern University Medical School, Chicago  | W. H. Northway, M.D.   | a-b-d                    | 12 mos.                  | Oct              | 16                             | \$450                             | Certificate                        |
| State University of Iowa College of Medicine, Iowa City*   | Lucille Daniels  | e                        | 12 mos.                  | Sept             | 20                             | \$200                             | Certificate                        |
| Charity Hospital of Louisiana, New Orleans, La.  | Harold Drunken, M.D.   | a-b                      | 14 mos.                  | Sept             | 3                              | None <sup>4</sup>                 | Cert.                              |
| Simmons College, Boston  | Dorothy Hoag   | d                        | 12 mos.                  | Feb/Sept         | 3                              | \$2500                            | Degree                             |
| Boston University College of Physical Education for Women,   | John C. Allen, M.D.  | a-c                      | 4 yrs.                   | Sept             | 24                             | \$400                             | Diploma                            |
| Sargent College, Cambridge, Mass.  | Frank W. Tappan  | c-d-e-f                  | 1-2-4 yrs.               | Sept             | 20                             | Univer.                           | Cert. or Degree                    |
| Bouvé-Boston School in affiliation with Tufts College, Med-<br>ford, Mass.   | Edna W. Hager, M.D.  | f                        | 4 yrs.                   | Sept             | 16                             | \$550                             | Dipl. & Degree                     |
| University of Michigan, Ann Arbor*   | Elizabeth C. Ward  | a-b-c-d-e-f              | 1-4 yrs.                 | June             | 16                             | \$50 semester <sup>2</sup>        | Cert. & Degree                     |
| University of Minnesota, Minneapolis*  | W. D. Paul, M.D.   | c                        | 2 yrs.                   | Sept             | 20                             | \$126                             | Degree                             |
| Mayo Clinic, Rochester, Minn.*   | Olive C. Farr  | a-b-c                    | 2 yrs.                   | Sept             | 38                             | \$250                             | Certificate                        |
| St. Louis University, Division of Health and Hospital<br>Services, St. Louis*  | Nathan H. Palmer, M.D.   | f                        | 2 yrs.                   | Jan/Sept         | 12                             | \$175                             | Degree                             |
| Washington University School of Medicine, St. Louis*   | D. L. Rose, M.D.   | a-b-d                    | 2 yrs.                   | Sept             | 16                             | \$400 (1 yr.)<br>\$1,200 (2 yrs.) | Cert. or Degree                    |
| Albany Hospital, Albany, N. Y.   | Ruth G. Monteith   | a-b-d                    | 12 mos.                  | Oct              | 12                             | \$350                             | Certificate                        |
| University of Buffalo, Buffalo, N. Y.  | W. T. Green, M.D.  | a-b-d                    | 15 mos.                  | Oct              | 16                             | \$225                             | Certificate                        |
| Columbia University College of Physicians and Surgeons,<br>New York City*  | Shirley M. Cogland   | a-b-d                    | 12 mos.                  | Oct              | 35                             | \$300                             | Diploma                            |
| New York University School of Education, New York City*  | Kenneth Christopher, M.D.  | a-b-d                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
| Duke University, Durham, N. C.*  | Adelaide L. McGarrett  | a-b-d                    | 12 mos.                  | Oct              | 40                             | \$600                             | Certificate                        |
| Frank E. Bunts Educational Institute, affiliated with The<br>Cleveland Clinic Foundation, Cleveland*   | Edward Moore, M.D.   | a-b-d                    | 12 mos.                  | Oct              | 12                             | \$300                             | Certificate                        |
| D. T. Watson School of Psychiatry, Leesdale, Pa.*  | James W. Rice, Jr., M.D.   | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$225                             | Certificate                        |
| Division of Physical Therapy of the School of Auxiliary<br>Medical Services of the University of Pennsylvania,<br>Philadelphia*  | F. J. Kotke, M.D.  | a-b-c                    | 12 mos.                  | Oct              | 35                             | \$300                             | Diploma                            |
| Baylor Hospital, Dallas, Texas   | Ruby Green Overmann  | a-b-c                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
| University of Texas School of Medicine, Galveston*   | E. C. Elkins, M.D.   | a-b-c                    | 12 mos.                  | Oct              | 40                             | \$600                             | Certificate                        |
| Hermann Hospital, Houston, Texas*  | Darrell D. Hunt  | a-b-c                    | 12 mos.                  | Oct              | 12                             | \$300                             | Certificate                        |
| Baruch Center of Physical Medicine and Rehabilitation,<br>Medical College of Virginia, Richmond*   | A. J. Kotke, M.D.  | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$225                             | Certificate                        |
| University of Wisconsin Medical School, Madison*   | Sister Mary Imelda   | a-b-c                    | 12 mos.                  | Oct              | 35                             | \$300                             | Diploma                            |
|  | Edgewood M. Krusen, Jr., M.D.  | a-b-c                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
|  | Peary J. Dyar  | a-b-c                    | 12 mos.                  | Oct              | 40                             | \$600                             | Certificate                        |
|  | G. W. N. Eggers, M.D.  | a-b-c                    | 12 mos.                  | Oct              | 12                             | \$300                             | Certificate                        |
|  | Ruby Decker  | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$225                             | Certificate                        |
|  | O. O. Selke, Jr., M.D.   | a-b-c                    | 12 mos.                  | Oct              | 35                             | \$300                             | Diploma                            |
|  | Elizabeth Barkley  | a-b-c                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
|  | Herbert Park, M.D.   | a-b-c                    | 12 mos.                  | Oct              | 40                             | \$600                             | Certificate                        |
|  | Susanne Hirt   | a-b-c                    | 12 mos.                  | Oct              | 12                             | \$300                             | Certificate                        |
|  | M. D. Bouman, M.D.   | a-b-c                    | 12 mos.                  | Oct              | 8                              | \$140                             | Cert. or Degree                    |
|  | Margaret A. Kohl   | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$300                             | Certificate                        |
|  | Edward M. Krusen, Jr., M.D.  | a-b-c                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
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|  | Margaret A. Kohl   | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$300                             | Certificate                        |
|  | Edward M. Krusen, Jr., M.D.  | a-b-c                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
|  | Peary J. Dyar  | a-b-c                    | 12 mos.                  | Oct              | 40                             | \$600                             | Certificate                        |
|  | G. W. N. Eggers, M.D.  | a-b-c                    | 12 mos.                  | Oct              | 12                             | \$300                             | Certificate                        |
|  | Ruby Decker  | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$225                             | Certificate                        |
|  | O. O. Selke, Jr., M.D.   | a-b-c                    | 12 mos.                  | Oct              | 35                             | \$300                             | Diploma                            |
|  | Elizabeth Barkley  | a-b-c                    | 12 mos.                  | Oct              | 32                             | \$600                             | Certificate                        |
|  | Herbert Park, M.D.   | a-b-c                    | 12 mos.                  | Oct              | 40                             | \$600                             | Certificate                        |
|  | Susanne Hirt   | a-b-c                    | 12 mos.                  | Oct              | 12                             | \$300                             | Certificate                        |
|  | M. D. Bouman, M.D.   | a-b-c                    | 12 mos.                  | Oct              | 8                              | \$140                             | Cert. or Degree                    |
|  | Margaret A. Kohl   | a-b-c                    | 12 mos.                  | Oct              | 16                             | \$300                             | Certificate                        |

# APPROVED SCHOOLS OF OCCUPATIONAL THERAPY \*\* Council on Medical Education and Hospitals of the American Medical Association

| Name and Location of School  | Director and Medical Director | Entrance Requirements | Duration of Course <sup>1</sup> | Classes Began | Tuition Per Year | Certificate, Diploma, Degree |
|--|-------------------------------|-----------------------|---------------------------------|---------------|------------------|------------------------------|
| University of Southern California, Los Angeles*  | Margaret S. Root              | Degree                | 18 mos.                         | Varies        | \$584            | Certificate                  |
| Mills College, Oakland, Calif.   | J. B. Armstrong, M.D.         | High sch.             | 5 yrs.                          | Varies        | \$545            | Cert. & Deg.                 |
| San Jose State College, San Jose, Calif.*  | Elsa H. Hill                  | Degree                | 2 1/2 yrs.                      | FebSept       | \$650            | Certificate                  |
| Colorado Agricultural and Mechanical College, Fort Collins, Colo.  | Mary L. Booth                 | Degree                | 18 mos.                         | Varies        | \$ 22.80         | Certificate                  |
| University of Illinois College of Medicine, Chicago*   | Marjorie Hall                 | High sch.             | 45 mos.                         | Varies        | \$ 25.80         | Cert. & Deg.                 |
| State University of Iowa, Iowa City*   | Beatrice D. Wade              | Degree                | 2 yrs.                          | Varies        | \$1812           | Certificate                  |
| University of Kansas, Lawrence   | S. W. Olson, M.D.             | High sch.             | 5 yrs.                          | MarSept       | \$110            | Cert. & Deg.                 |
| Boston School of Occupational Therapy, 7 Harcourt St., Boston*   | Elizabeth Hunsberry           | High sch.             | 19 mos.                         | FebSept       | \$ 782           | Certificate                  |
| Wayne University, Detroit*   | W. M. Fowler, M.D.            | High sch.             | 45 mos.                         | FebSept       | \$ 782           | Cert. & Deg.                 |
| Kalamazoo School of Occupational Therapy, Kalamazoo, Mich.   | Nancy B. Greenman             | High sch.             | 45 mos.                         | FebSept       | \$1102           | Certificate                  |
| Michigan State Normal College, Ypsilanti, Mich.*   | D. L. Rose, M.D.              | Degree                | 2 yrs.                          | Sept          | \$500            | Degree                       |
| University of Minnesota, Minneapolis*  | Marjorie B. Greene            | High sch.             | 5 yrs.                          | Sept          | \$500            | Degree                       |
| College of St. Catherine, 204 Randolph Ave., St. Paul  | Barbara Jett                  | High sch.             | 18 mos.                         | Varies        | \$150            | Degree                       |
| Washington University School of Medicine, St. Louis*   | E. A. Weaver, M.D.            | High sch.             | 46 mos.                         | Varies        | \$ 752           | Certificate                  |
| University of New Hampshire, Durham*   | Marion R. Spear               | Degree                | 18 mos.                         | FebSept       | \$ 752           | Certificate                  |
| Columbia University College of Physicians and Surgeons, New York City*   | Donald May, M.D.              | 1 yr. coll.           | 4 yrs.                          | Sept          | \$ 752           | Cert. & Deg.                 |
| New York University School of Education, New York City*  | Frances Herrick               | High sch.             | 5 yrs.                          | Sept          | \$1402           | Degree                       |
| Ohio State University, Columbus*   | J. W. Rae, Jr., M.D.          | High sch.             | 40 mos.                         | Sept          | \$149.55         | Degree                       |
| Philadelphia School of Occupational Therapy of the School of Auxiliary Medical Services of the University of Pennsylvania, Philadelphia* | Borghild Hansen               | Degree                | 16 mos.                         | Varies        | \$210            | Degree                       |
| Texas State College for Women, Denton  | F. J. Kottke, M.D.            | High sch.             | 18 mos.                         | Varies        | \$240            | Degree                       |
| Richmond Professional Institute, 901 W. Franklin St., Richmond, Va.*   | Sister Jeanne Marie           | Degree                | 18 mos.                         | Varies        | \$240            | Degree                       |
| College of Puget Sound, N. 15th and Warner Sts., Tacoma, Wash.   | E. M. Ryan, M.D.              | High sch.             | 18 mos.                         | Varies        | \$240            | Degree                       |
| University of Wisconsin, Madison*  | R. A. Moore, M.D.             | High sch.             | 23 mos.                         | Sept          | \$2502           | Cert. & Deg.                 |
| Milwaukee-Dowder College, Dept. of Occupational Therapy, 2512 E. Hartford Ave., Milwaukee  | E. A. Macdonald, M.D.         | Degree                | 17 mos.                         | Sept          | \$600            | Certificate                  |
| Mount Mary College, 923 and Burleigh, Milwaukee  | Marie L. Francis              | 2 yrs. coll.          | 27 mos.                         | Sept          | \$600            | Certificate                  |
|  | W. B. Snow, M.D.              | 1 yr. coll.           | 4 1/2 yrs.                      | FebSept       | { University     | Cert. & Deg.                 |
|  | Frieda J. Rehn                | High sch.             | 4 yrs.                          | Varies        | { University     | Cert. & Deg.                 |
|  | Barbara Locher, M.D.          | High sch.             | 4 yrs.                          | Varies        | { University     | Cert. & Deg.                 |
|  | R. E. Worlen, M.D.            | Degree                | 18 mos.                         | Sept          | \$600            | Certificate                  |
|  | Helen S. Willard              | High sch.             | 18 mos.                         | Sept          | \$600            | Cert. & Deg.                 |
|  | F. C. Yaskin, M.D.            | Degree                | 18 mos.                         | FebSept       | \$ 502           | Certificate                  |
|  | Fanny B. Vanderkoo            | High sch.             | 10-18 mos.                      | FebSept       | \$182+           | Certificate                  |
|  | O. T. Woods, M.D.             | Degree                | 5 yrs.                          | Sept          | \$200            | Degree                       |
|  | H. Elizabeth Messick          | High sch.             | 2-3 yrs.                        | JanSept       | \$250            | Certificate                  |
|  | E. Barrett, M.D.              | High sch.             | 5 yrs.                          | Sept          | \$250            | Cert. & Deg.                 |
|  | F. E. Den Hartog, M.D.        | High sch.             | 5 yrs.                          | Sept          | \$1502           | Cert. & Deg.                 |
|  | Caroline G. Thompson          | High sch.             | 3 yrs.                          | Sept          | \$350            | Certificate                  |
|  | H. D. Bouman, M.D.            | High sch.             | 5 yrs.                          | Sept          | \$310            | Cert. & Deg.                 |
|  | Hennetta W. McNary            | 2 yrs. coll.          | 5 yrs.                          | Sept          | \$350            | Certificate                  |
|  | M. C. Borman, M.D.            | High sch.             | 5 yrs.                          | Sept          | \$310            | Cert. & Deg.                 |
|  | Sister Mary Arthur            | High sch.             | 5 yrs.                          | Sept          | \$310            | Cert. & Deg.                 |
|  | J. C. Griffith, M.D.          | High sch.             | 5 yrs.                          | Sept          | \$310            | Cert. & Deg.                 |

\*\* Reprinted J. A. M. A. 146:188 (May 12) 1951. (Revised to May 10, 1952.)

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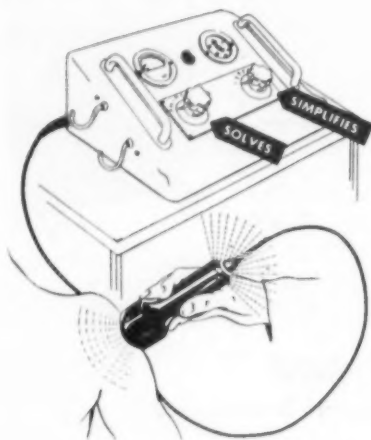
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## MEETINGS OF INTEREST TO THOSE IN THE FIELD OF PHYSICAL MEDICINE AND REHABILITATION

In this column will be published information about meetings of interest to those in the field of physical medicine. New data should be sent promptly to the office of the ARCHIVES, 30 North Michigan Avenue, Chicago 2, Illinois.

*American Congress of Physical Medicine and Rehabilitation* — 31st Annual Session, The Palmer House, Chicago, August 31 through September 4, 1953. Walter J. Zeiter, M.D., Chairman, Convention Committee, 30 North Michigan Ave., Chicago 2.

*Chicago Society of Physical Medicine and Rehabilitation* — Regular monthly meetings, September through May, every fourth Wednesday. Dr. Joseph Koczur, Secretary-Treasurer, 55 E. Washington St., Chicago.

*Latin-American Congress of Physical Medicine* — Scheduled for February, 1954. Cassius Lopez de Victoria, M.D., Executive Director, 176 E. 71st St., New York 21, N. Y.

*New York Society of Physical Medicine* — Monthly meetings held first Wednesday. Madge C. L. McGuinness, M.D., Secretary, 48 E. 62nd St., New York 21, N. Y.

*Pennsylvania Academy of Physical Medicine and Rehabilitation*—Regular meetings on third Thursday of month, held bi-monthly. Secretary, J. Murl Johnston, M.D., 694 Washington Rd., Mt. Lebanon, Pittsburgh, Pa.

*American Occupational Therapy Association*—Annual Conference, November 13-20, 1953, Shamrock Hotel, Houston, Texas. Marjorie Fish, OTR, Executive Director, 33 West 42nd Street, New York 18, N. Y.

### International

*World Congress of the World Confederation for Physical Therapy*—London, England, September 7-12, 1953. Secretary, Miss M. J. Neilson, Chartered Society of Physiotherapy, Tavistock House, South, Tavistock Square, London, W.C. 1, England.

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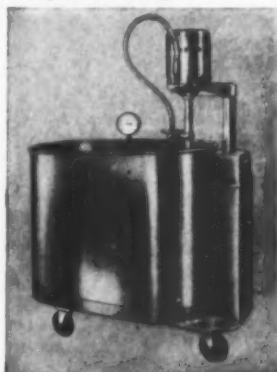
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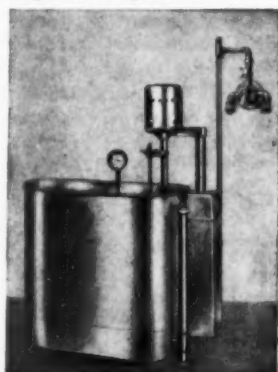
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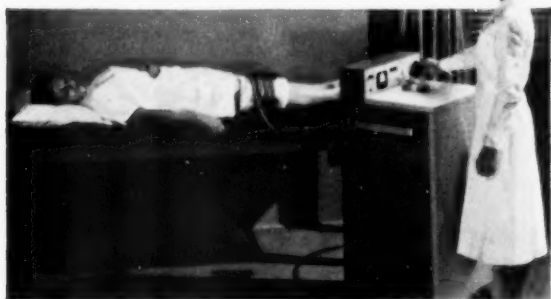
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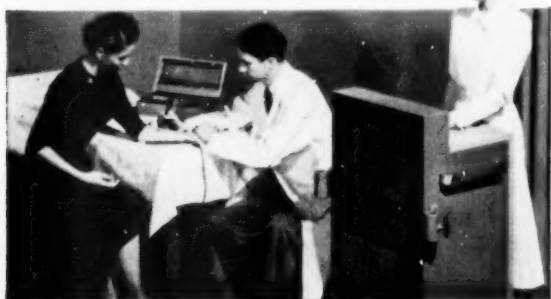
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